June

MODERN MECHANIX AND INVENTIONS

NOW 15¢ IN CANADA 20¢

NRA CODE

DYNO-WHEEL MOTOR BUS

SEE PAGE 87

The World's Most Costly Blunders

WORLD'S GREATEST TIRE BARGAINS

NEW LOW PRICES ON

GOODYEAR, Firestone, FISK
U.S., Goodrich, *and others..*

HEY, FELLOW! YOU'RE DOING 80! ARE THESE TIRES IN GOOD SHAPE?

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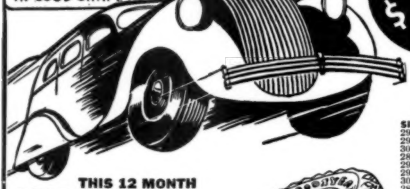

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Drive YORK TIRES at high speed over the roughest roads. These tires can really "take it." Thousands of hard drivers vouch for their unusual stamina. Users say, **"York Tires stand more punishment and give more service than other reconstructed tires."** Try a set yourself. See how the original York process of reconstruction gives to tires the stubborn kind of toughness you know you can depend upon. **19 years of success back of every tire we sell.** Then . . . you have the additional protection of the iron clad York Guaranty Bond . . . a 12 month written guarantee of 100% satisfactory service . . . you to be the sole judge. No "ifs" or "ands." No arguments. Don't wait. While York prices are lowest in history, get your order in and enjoy these supreme values. Send at once while these low prices are still in force.

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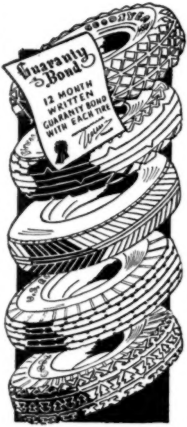

BALLOON TIRES

Size Rim	Tires	Tubes	Size Rim	Tires	Tubes
29x4.40-21	$2.15	$0.85	30x5.25-20	$2.95	$1.15
29x4.50-20	2.35	0.85	31x5.25-21	3.25	1.15
30x4.50-21	2.40	0.85	29x5.50-18	3.35	1.15
28x4.75-19	2.45	0.95	29x5.50-19	3.35	1.15
29x4.75-20	2.58	0.95	30x6.00-18	3.40	1.15
29x5.00-19	2.85	1.05	31x6.00-19	3.48	1.15
30x5.00-20	2.85	1.05	32x6.00-20	3.45	1.25
28x5.25-18	2.89	1.15	33x6.00-21	3.55	1.25
29x5.25-19	2.95	1.15	32x6.50-20	3.75	1.35

REGULAR CORD TIRES

Size	Tires	Tubes	Size	Tires	Tubes
30x3	$2.25	$0.65	32x4½	$3.35	$1.15
30x3½	2.35	0.75	33x4½	3.45	1.15
31x4	2.95	0.85	34x4½	3.45	1.15
32x4	2.95	0.85	30x5	3.65	1.35
33x4	2.95	0.85	33x5	3.75	1.45
34x4	3.25	0.85	35x5	3.85	1.55

HEAVY DUTY TRUCK TIRES

Size	Tires	Tubes
30x5 Truck	$4.25	$1.95
34x5 Truck	4.25	2.00
32x6 Truck	7.95	2.70
36x6 Truck	9.95	3.95
34x7 Truck	10.95	3.95
36x8 Truck	12.45	4.25
40x8 Truck	15.95	4.95

TRUCK BALLOON TIRES

Size	Tires	Tubes
600-20	$4.25	$1.65
650-20	4.45	1.95
700-20	5.95	2.95
750-20	6.95	3.75
825-20	8.95	4.95
900-20	10.95	5.65
975-20	13.95	6.45

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deposit with each tire ordered. (Send $4.00 deposit on each Truck Tire ordered.) We ship balance C. O. D. Deduct **5 per cent** if cash is sent in full with order. **ALL TUBES BRAND NEW—GUARANTEED.** Tires failing to give 12 months' service replaced at half price.

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In Your Spare Time For A GOOD RADIO JOB

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Many Radio Experts Make $40, $60, $75 a Week

Why struggle along in a dull job with low pay and no future? Start training now for the live-wire Radio field. I have doubled and tripled salaries. Hundreds of successful men now in Radio got their start through N. R. I. training.

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Hold your job. I'll not only train you in a few hours of your spare time a week, but the day you enroll I start sending you Extra Money Job Sheets which quickly show you how to do Radio repair jobs common in most every neighborhood. I give you Radio Equipment for conducting experiments and making tests that teach you to build and service practically every type of receiving set made. Clee T. Reiter, 30 W. Beechwood Ave., Dayton, Ohio, wrote: "Working only in spare time, I made about $1,500 while taking the Course."

Find Out What Radio Offers

My book has shown hundreds of fellows how to make more money and win success. It's FREE to any ambitious fellow over 15 years of age. Investigate. Find out what Radio offers you. Read what my Employment Department does to help you get into Radio after graduation, about my Money Back Agreement, and the many other N. R. I. features. Mail the coupon in an envelope, or paste it on a 1c post card TODAY.

J. E. SMITH, President, Dept. 5FH
National Radio Institute, Washington, D. C.

J. E. SMITH, President
National Radio Institute

The man who has directed the Home-Study Training of more men for the Radio industry than any other man in America.

HERE'S PROOF that my training pays

Now Owns Own Business

"If I had not taken your Course I would be digging ditches instead of running my own business. One week I made $70 on repairing alone and this doesn't count sales. If a fellow wants to get into Radio, N. R. I. is the starting point." S. Lowis, Modern Radio Service, Pittsfield, Ill.

Spare Time Jobs Earn $15 a Week

"I have no trouble getting Radio work. I have the reputation of being the best Radio man in town, and average $15 to $20 a week for spare time only." G. Bernard Crey, 153 Washington St., Bronson, Michigan.

Owns His Success to Radio Training

"Since 1929 I have earned my living in Radio. I owe my last three jobs to N. R. I. I am now in the main control room of one of the large broadcasting chains." Serge A. De Somov, 1516 Library Ave., New York City.

MAIL THIS NOW

J. E. SMITH, President, Dept. 5FH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send your book which points out the spare time and full time job opportunities in Radio and your 50-50 method of training men at home in spare time to become Radio Experts.

(Please print plainly)

NAME ..... AGE .....

ADDRESS .....

CITY ..... STATE .....

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The Story of LaSalle Student Shaw

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"Last winter my wife brought me a LaSalle ad on Higher Accounting—showing how I could study in spare time for the job ahead. I investigated, and enrolled January 23, just in time! For—

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"Smiling, the boss handed me a letter. It was from LaSalle to him, announcing my enrollment and my good work on the first lesson. 'We are keeping you,' he said, 'because we like your spirit.'

"Naturally, I had more work to do, with the smaller force, but my training made it easier. I learned quickly, and when the Department Manager left, the boss moved me up.

"I have since been promoted twice, and now carry the title of Chief Accountant—at a salary several times greater. The future looks bright. If it had not been for LaSalle, I would be looking for a job right now."

BIGGER PAY FOR YOU—
thru LaSalle Spare-Time Training

That's a story of what spare-time study has done for just one man. There are thousands of others like Shaw who found themselves through LaSalle. Now—how about yourself? Do you want a better position and higher pay?

You can win them, even today, if you can do the work. LaSalle experts will show you how, personally guide you step by step to success. Simply mark on the coupon the field you are interested in, and we will send you FREE, a valuable booklet about it, telling of opportunities open to you. No cost or obligation—and what you find out may put you on the road to success and financial independence.

The opportunity that is open today—*right now*—may not be here tomorrow. Don't put it off—but reach for your pencil, fill out, and mail *today*.

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Position.....

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JUNE
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Number 2

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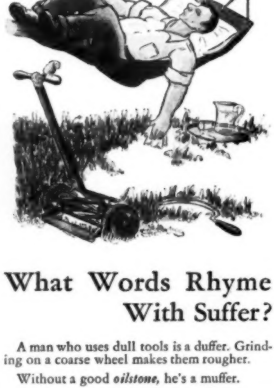

What Words Rhyme With Suffer?

A man who uses dull tools is a duffer. Grinding on a coarse wheel makes them rougher.

Without a good *oilstone*, he's a muffer.

Shop tools for cutting, boring, drilling, can be given a keen edge which is tougher. At home, your wife needs a sharpener for the carver, scissors, and kitchen knives—so she won't suffer. You need a Norton-Pike scythestone and axe stone. For the lawn mower a Red Head Utility File. Then your wife won't take in the hammock and call you a bluffer.

Cherished *Oilstones*

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Name.....

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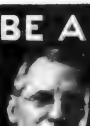

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THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new, non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

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Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves Inventors at all. During their work or leisure moments they get an idea. They work it out on paper. They get in touch with us about Protection. Many a man has practically stumbled onto a real money-making invention. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? There's no telling who inventors are. Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.

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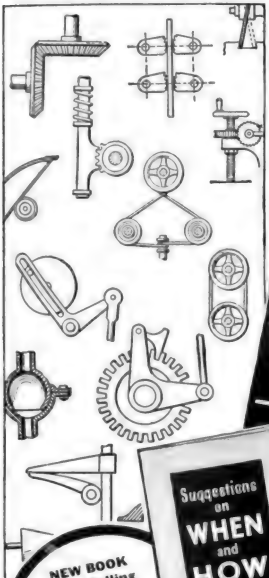

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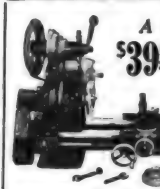

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Random Chips from

Three new clubs get charters in I. S. M. M. I. Other clubs report new members, activities, and election of officers. Here's good and bad news for the boat builders. MM's How to Build 20 Boats is sold out and Rabl designs a four-in-one boat. And the editor philosophizes on the value of building things in your own workshop.

When H. B. Harvey sent the picture at right showing his Sunray coming out of a bedroom he took first prize of $5.00. The Governor Winthrop desk (left) won second prize of $3.00.

WHAT is the value of building things in your own workshop? In rare cases the cost of a homemade article may be more than a similar article produced under mass production methods.

But the value of building your own can not be counted in dollars and cents. Anyone who has built something, even though it is only a shelf, knows the joy of a job well done.

That shelf has done more than that. It has taught its builder how to use plane, saw, hammer, nails, screws, screw driver, and drill. Possibly unconsciously, it has given a lesson in the basic principles of science. The builder learns the amount of weight his shelf will support and in selecting his brackets has adopted the structural cornerstone of engineering.

In a world that daily is becoming more complicated scientifically the home workshop builder keeps step with progress. He knows what makes the wheels go 'round and the automobile, the radio, and the vacuum cleaner are no mysteries to him. When an emergency arises, he is ready to solve problems and make repairs. He becomes a valuable handy man.

The value of the home workshop may be greater than that. When the depression came and jobs disappeared, men had to turn to new fields. And the man in the home workshop was usually ready to step into a new field or developed his own business building novelties, furniture, models, or boats. He had learned how to use his ingenuity in the workshop. And when the pinch came in the depression, the home workshop fan used his imagination to find a way out.

When H. B. Harvey wanted to build a boat and found that he did not have a shop large enough, he used his ingenuity and solved the problem by building the boat in his bedroom. His photo wins first prize of $5.00 this month. Here's his brief letter:

Peekskill, N. Y.

Dear Editor:

This is a picture of a Sunray coming out of my bedroom window. It is not quite finished yet. I have heard of boats being built in cellars and on roofs, but did you ever hear of one being built in a bedroom?

H. B. Harvey.

* * *

We have some sad news for the boat builders. One of MM's most popular books "How to Build 20 Boats" is out of stock. Every copy has been sold. Until another MM boat book appears on the newsstands we advise boat builders to get a copy of MM's blueprint booklet, listing the most popular boats, which can be had for a stamped and addressed return envelope.

* * *

Second prize of $3.00 this month went to Fred Michel for his photo of an excellent example of home-built furniture. Let him tell about this Governor Winthrop desk, republished in the 1934 How To Build It, which can be obtained from MM for 50 cents.

Sheboygan, Wis.

Dear Editor:

Here is a photo of a Governor Winthrop

the Editor's Workbench

desk made by my father from plans in the November, 1932, issue of *Modern Mechanix and Inventions*. It was made of solid quarter-sawed oak obtained from an old table.

Keep up the good work and give us more how-to-builds. As a suggestion how about having Sam Rabl or Westy Farmer design a small boat for us sailing bugs?

Fred J. Michel.

Fred, we think we have just the thing for you. Turn to page 94 and you will find Rabl's latest boat, in fact four boats combined in one design.

* * *

Bill Ott, of Chicago, took third prize of $2.00 this month with the photo of his midget car. His letter:

Chicago, Ill.

Dear Editor:

I am sending a snapshot of my midget car which I built from MM hints. She is powered with a one-cylinder Johnson Ultimotór. It has steering gears on the order of the Model T. No parts have been taken from other automobiles. They have all been home-made. She makes about 20 m.p.h.

William Otto, Jr.

* * *

The International Society of Modern Mechanix and Inventors continues to grow. In the past few weeks three more clubs have been organized. William Stein, as president, received an engraved charter for the Federal Huber Homecraft Club of Plano, Ill. At Haverhill, Mass., Reginald Dawkins is president of the 5 Star M & M Club. At Grand Rapids, Mich., the East Side Experimental Club has been organized. This interesting

Here is William Otto, Jr., in the midget car that won third prize of $2.00 in this month's Workbench photo contest.

New HI-N-DRI Yacht club flag officers and secretary in the group picture are from left to right: Jack Crews, Fleet Captain; Bob Butte, Rear Commodore; Ira Rohland, Vice Commodore; David Forsyth, Commodore; Miss Betty Stevens, secretary. Photo at right shows Alex Adastik, president of the East Side Experimental Club of Grand Rapids, Michigan.

letter comes from Alex Adastik, the club's president, whose photo is shown in this department:

Grand Rapids, Mich.

Dear Editor:

I am sending you some snapshots. The snow sled you see in one of the pictures belongs to Ed Germroad. It is rebuilt from a light plane with a Ford T air-cooled engine. We intend to finish it this summer for the coming winter.

All the members shared in building it. The boys would come over every Friday and Saturday night and work until 2:30 in the morning. When we worked late, we served eats about midnight and sometimes I would bring in the radio from the house.

Alex Adastik.

Stephen Prohaska, president of the Greater Detroit Artisans, reports two new members for the club, Robert Bangham and John Leskowsky.

Commodore David S. Forsyth reports election of new officers for the HI-N-DRI Yacht Club, the largest charter group in I. S. M. M. I., and sends this letter:

Los Angeles, Calif.

Dear Editor:

In the recent Mid-Winter Regatta, sponsored by the Civic Regatta Association, the

[*Continued on page 20*]

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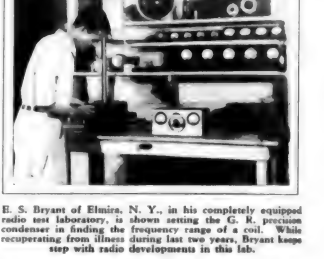
Chips From the Editor's Workbench

[*Continued from page 19*]



E. S. Bryant of Elmira, N. Y., in his completely equipped radio test laboratory, is shown setting the G. R. precision condenser in finding the frequency range of a coil. While recuperating from illness during last two years, Bryant keeps step with radio developments in this lab.

wind blew from 38 to 45 miles an hour and of the nineteen boats entered in the 13' to 16' unclassified division only nine finished. Only three "Sunrays" were entered and they finished second, fourth, and fifth. We were the fifth, lost our forestay early in the race and were afraid of driving the boat as hard as possible but finished well anyway.

MM certainly started the new year off with a bang with two good boating articles by Rabl. The first was a timely article. It doesn't matter how much one lectures a person on not changing boat plans, they will do it anyway. It seems to be human nature.

Some time in the future I'll send you some pictures of our new craft. At present we have under construction one schooner, six small racing sloops, three cruisers, three cruising sloops, and two runabouts.

David S. Forsyth.

That's some fleet that the HI-N-DRI Club is launching, isn't it? Clubs interested in the International Society of Modern Mechanix and Inventors should write to MM for an application blank. Charters are open to groups of five or more subscribers to MM. Special subscription rates and discounts on blueprints and MM books are offered to all charter members.

* * *

From England comes this letter of congratulations:

London, England.

Dear Editor:

I wish to offer my congratulations to you on the new *Modern Mechanix and Inventions*. It

[*Continued on page 28*]

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Hold a Schick INJECTOR Razor against the side of your left hand. Note the position of the blade edge. Then swing the handle downward, feeling meanwhile the position of the blade edge against the hand.

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MARINE GLUE ISN'T GLUE

Will marine glue hold together joints in boats which have previously been treated with oil?—L. V. R., Austin, Minn.

Marine glue is an erroneous term applied to waterproofing or leak-preventing substances like that developed in 1780 by Commander Jeffries of the Royal British Navy. He concocted a mixture of resin, tar, and chalk to replace pitch in "paying" the seams of decks of naval vessels.

Liquid marine glue is used to apply canvas over wood surfaces without heat, and as an all-around waterproofing in boat joints. It will stick to oiled surfaces, but is much better if applied directly to the bare wood.

TRAINING TRANSPORT PILOTS

Do you believe a fellow would have a good chance of a job if he took one of the better commercial aviation courses at a recognized aviation school? How can I prepare myself for one of these schools or for the Army flying school in Texas?—H. F., Providence, R. I.

The good flying schools can and do teach flying which can qualify a man for a transport pilot's license. These licenses are based upon the number of hours in the air, and upon a number of rigid tests. As to Army aviation, if you have the necessary two years of college education, are within the age limit, and can pass the strict physical examination, you have a chance to pass the entrance examinations. A booklet giving all the requirements for entrance may be obtained from the Chief of Air Corps, Washington, D. C.

SHORT WAVE AUTO RADIOS

Are there any laws prohibiting the use of short wave radio receivers in automobiles?—A. N., Minneapolis, Minn.

As far as we can determine, there are no Federal laws which would prohibit the use of short wave radio receivers in autos. In some states, however, permission must be secured from a designated officer. The City of Minneapolis, for instance, has an ordinance regulating the use of short wave sets. For complete information, it is suggested that you address an inquiry to the Attorney General of your state or to the City Attorney of your city.

SIMPLE GELATIN DUPLICATOR

Can you tell me how a gelatin duplicator works? What is the formula for the material used? Can I duplicate newspaper articles?—J. L., Chicago, Ill.

Heat together 12 oz. glycerine, 2 oz. gelatin, 7½ oz. water, and 2 oz. sugar, then pour slowly in a shallow pan as large as your letter heads. Now prepare the duplicating ink by dissolving 2 parts methyl violet in a mixture of 2 parts alcohol and 4 parts glycerine. Dissolve 1 part of sugar in 24 parts water, and mix this solution with the other. Material to be duplicated is written on a sheet of heavy paper with this purple ink. When dry, the paper is laid, inked side down, over the gelatin pad, and pressed firmly for several minutes. As many as 60 blank sheets can now be laid on the pad, rolled gently, and carefully lifted off as clear duplicates. When copies become too faint, wash off the ink with a damp sponge, and pad is ready for another operation.

COLORING LIGHT BULBS

Is there a simple, inexpensive process whereby electric light bulbs can be colored?—W. W., Omro, Wisconsin.

Repeated dipping in the desired color of Easter egg dye will tint electric light bulbs to any desired shade.

A HUMAN RADIO RECEIVER

I have a friend who insists he heard speech and music with ordinary headphones simply by holding the phone tips in his hands. Do you think this is possible?—H. M., Brookford, N. C.

By holding one phone tip in each hand, a closed circuit is formed through the phones and the body. There is a possibility that your friend was picking up by induction signals being rebroadcast by some oscillating re-

[*Continued on page 24*]

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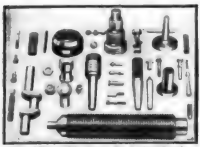

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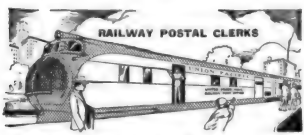

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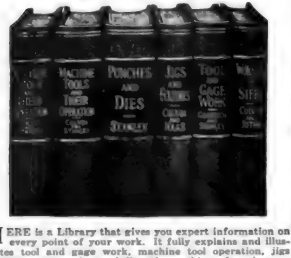

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Problems Editor Answers Queries

[*Continued from page 22*]

ceiver in the vicinity. Readers having information on this interesting subject should write to the Problems department.

NEW USE FOR PHONOGRAPH RECORDS

I am searching for a plastic material for my model boat hulls which will soften in boiling water, stretch to form a compound curve, and take a high polish. It must be easily cut with a saw, and available in sheet form about 1/16" thick. Is there any material that will meet these requirements?—H. J. B., Brooklyn, N. Y.

Old phonograph records can be molded into curved shapes by applying heat, and can be rubbed to a high gloss with an electric flat iron. This material may be the answer to your model boat problem.

SOUTH SEA ISLAND LETTERS

How can I obtain stamps and letters from interesting islands in the South Seas?—R. J., Omaha, Nebr.

A 15,000-mile cruise starting this August, and including calls at Cocos, Galapagos, Juan Fernandez, Easter, Pitcairn, and other South Sea isles will be made by the Pacific Navigation Line, Inc., 311 California Street, San Francisco, Cal. This company offers to send letters from any or all of these out-of-the-way places to stamp collectors, and will send complete information on this service to MM readers who are interested.

AUTOMATIC BATTERY CHARGER

I have a washing machine engine belted to an automobile generator, to charge two storage batteries supplying light for my workshop. I already have an auto starter hooked up to the engine, and would like to know if it is possible to make a switch which will automatically start the engine when the batteries are down, and stop it again when the batteries are fully charged.—A. S., McDonald, Pa.

As a storage battery discharges, the voltage decreases slightly. A photo-electric cell directed on one of the lamps in your workshop could detect this change in voltage. Connect a 6-volt lamp and a rheostat in series across the battery, and adjust the rheostat until the lamp just barely glows when the battery is almost discharged. A photo-cell directed on this lamp could be set to close relays and start the engine when the decreasing voltage changed the illumination given out by the lamp.

(Editor's Note—Letters sent to this department will not be answered unless accompanied by a stamped, addressed envelope or reply card. Double government reply postcards are convenient for sending in queries. Address Problems Editor, Modern Mechanix Publ. Co., Minneapolis, Minn.)

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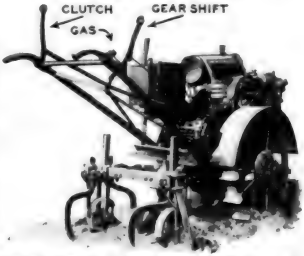
Chips From the Editor's Workbench

[*Continued from page 20*]



H. E. Daellenbach, of Beaver, Pa., built this tractor. It has a twin Harley motor and a three speed transmission.

is really excellent. I find the new rotogravure printing more pleasing to the eye.

MM is much appreciated here. After I have read my issue, all my friends want it because they say it is something different. Might mention that I was introduced to the magazine by my American friend four years ago and I have not yet missed an issue.

E. W. Calland.

To our foreign readers (and American as well) we extend an invitation to contribute articles to MM. Send us good photos and brief, clear articles about the new, unusual inventions in your countries. For each one that is acceptable MM pays good rates.

* * *

We want to hear, too, from our model building readers. Send in photos of your model and, if you think MM could use an article telling how to build it, send it along too with detailed construction drawings. These, if accepted, will be paid for at regular rates.

* * *

And now for some odds and ends. Dempster H. Wisemay of Philadelphia wants Robert Page Lincoln to write an article on salt water fishing. We think Lincoln will fill the bill soon. . . . Henry F. Schwass, of Oak Park, Ill., informs us that he is having good success with MM's Hitch Hiker's two tube portable set. Plans and instructions for the set are in MM's Radio Builders Manual, now on sale for 50 cents. . . . From Paul M. Turnbull, of Arbuckle, Calif.: **Some of the ideas I have received from your magazine have paid the subscription price many times over in savings.** Which brings us back to where we began. Building your own has some rewards after all. See you next month.

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Wiley Post releases landing gear from his five-year old "Winnie Mae" just after take-off from Los Angeles airport on second transcontinental sub-stratosphere flight. Photo below shows plane just after it landed at Cleveland, Ohio when oxygen supply for stratosphere helmet ran low. Plane was undamaged.

Wiley Post wore this special suit and aluminum helmet while traveling at 340 miles per hour in rarified upper air of the lower stratosphere region in search of new commercial airway routes.

NEW speed records are being set, new highways of the air blazed by robot pilots over unconquered oceans and high in the sub-stratosphere. Following invisible radio beam airways through clouds and storm, thousand mile flights are being made daily with automatic control, using radio position finders as on-course indicators.

Through the sub-stratosphere at 340 miles an hour whizzed Wiley Post recently, hoping the rarified, storm-free upper atmosphere would enable him to break the transcontinental speed record, and chart a new airway across the country.

Out over the treacherous Pacific Ocean circled a Douglas air liner, sometimes known as the robot-controlled "mystery plane," carrying new radio compass equipment designed for blind flying over water.

Near the Virgin Islands, a nineteen-ton Pan American *Clipper*, making a test flight, set a new distance record for seaplanes. The giant amphibian will be used on regular schedules across the Pacific Ocean.

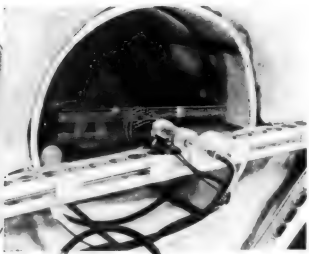
Certain now, after two unsuccessful attempts, that he has the answers to sub-stratosphere flying problems, Wiley Post plans new flights for the "Winnie Mae," trim five-year old record-making monoplane, and for the Northrop low-wing monoplane being groomed for him in preparation for another try at the transcontinental speed record.

Flying as fast as 340 miles an hour, sometimes more than seven miles above the earth, Post had the transcontinental speed record in his grasp recently when he whizzed over city after city on his attempted non-stop hop from Los Angeles to New York. Landing gear was dropped shortly after the take-off, and the doubly-supercharged plane sent into the up-

New RADIO BEAM AIRWAYS

Robot controlled and flying blind, this giant Douglas transport, government "mystery plane," roared out over the Pacific to ships stationed hundreds of miles out, in tests of new radio direction finding apparatus. Circular loop antenna may be seen atop fuselage of the plane.

Popularly known as the "mystery plane," this twin-engined Douglas transport finds its way through uncharted skies by following ordinary radio station broadcast beam signals.



Close-up of visual unit of new radio direction finder tested by U. S.

per air where wind resistance is less and storms are unknown.

Sixty miles beyond Cleveland the oxygen supply ran low. Post was forced to abandon the attempt, and circle back to Cleveland Airport for a "belly" landing.

An earlier stratosphere attempt ended suddenly when engine trouble necessitated a forced landing in the Mojave desert, less than an hour by air from the take-off point.

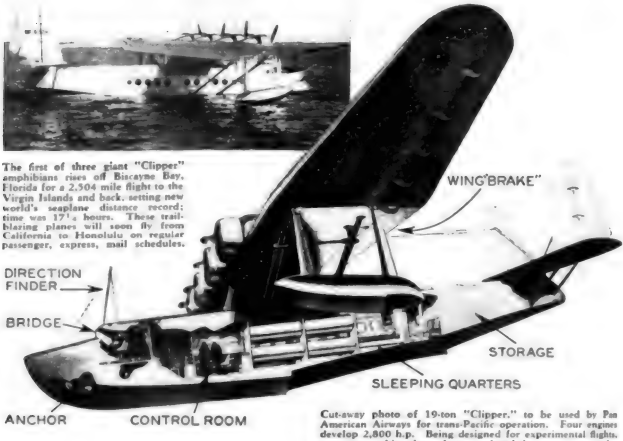
Reduced air pressure and lack of oxygen made it necessary to wear a rubberized silk suit and special aluminum helmet which together weigh only 16 pounds. Liquid air in a generator unit was evaporated and fed into the helmet for breathing purposes.

Music and announcements from key broadcasting stations along the route guided Wiley

Test flights over the Pacific proved this radio direction finder could get accurate bearings from any radio stations. Geoffrey G. Kruesi, the inventor, is standing beside complete radio unit.

"Clipper" Amphibians to Inaugurate California-to-China Air Route

The first of three giant "Clipper" amphibians rises off Biscayne Bay, Florida for a 2,504 mile flight to the Virgin Islands and back, setting new world's seaplane distance record; time was 17½ hours. These trail-blazing planes will soon fly from California to Honolulu on regular passenger, express, mail schedules.



Cut-away photo of 19-ton "Clipper," to be used by Pan American Airways for trans-Pacific operation. Four engines develop 2,800 h.p. Being designed for experimental flights, passenger cabins have been replaced by extra gas tanks. Cruising range is 3,000 miles, at cruising speed of 150 m.p.h.

Post at all times, even when layers of clouds blotted the earth from view. An indicating meter on the instrument panel deflected the instant the nose of the "Winnie Mae" veered from the course. Headphones built into the helmet indicated by a change in tone whether the course was being followed, giving a double check.

Winging far out over the Pacific in a giant Douglas transport, army fliers put through its paces a new radio compass developed by the government. Secrecy surrounded every maneuver of the plane, which for a time was being groomed for the long, treacherous hop from California to Hawaii.

Equipped with the Kruesi radio compass, the plane was able to chart its course by signals from any radio broadcast transmitter. This "homing-pigeon" device, together with the Sperry automatic gyro-pilot, was revealed to be the "mystery" of the many test flights between Oakland, Calif., and ships at sea. The plane was chartered to the Department of Commerce for these tests by TWA.

With hopes of obtaining permission for the Hawaiian hop quashed, the crew of the government "mystery" plane went back to their original jobs in widely separated corners of the earth. Captain Albert F. Hagenberger, blind flying expert of the Air Corps, will carry on further tests in the east with the radio navigation equipment, after the plane is returned to its owners.

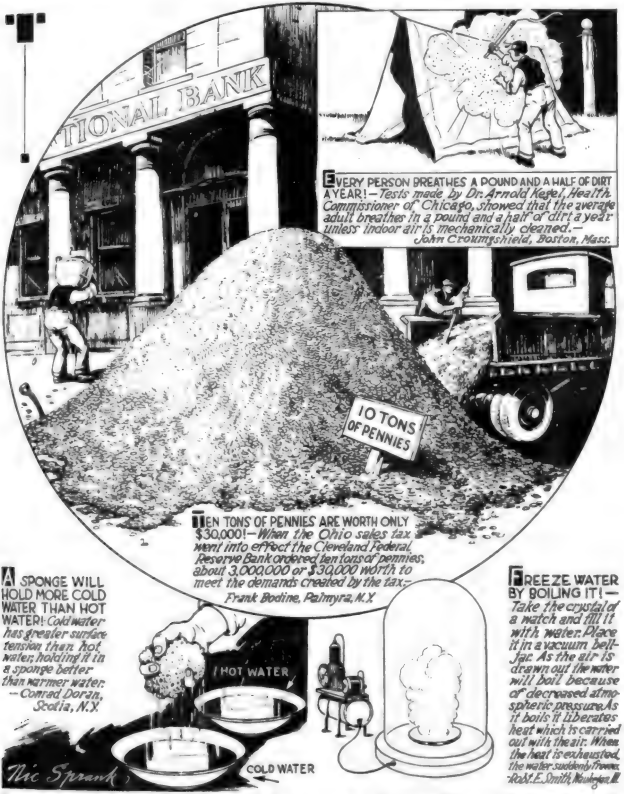
Well on its way to realization is the plan to connect North America to China by air. Final preparations are now being made for a regular air line across the widest ocean on the earth, the Pacific, with five stepping stones or air bases along the route to serve as refueling points.

One of the planes built for this route, a gigantic 19-ton *Clipper*, recently set a new world's seaplane distance record by making a flight several hundred miles longer than the longest over-water hop on the proposed service to Asia's trade marts. Checking in at Biscayne Bay, Miami, Fla., after a 2,504-mile flight to the Virgin Islands and back, the tanks of the giant amphibian still held enough gas for 550 additional miles.

[*Continued on page* 132]

$30,000 Buys Ten Tons of Pennies

Says Nic Sprank in Oddities of Science



EVERY PERSON BREATHES A POUND AND A HALF OF DIRT A YEAR!—*Tests made by Dr. Arnold Kegel, Health Commissioner of Chicago, showed that the average adult breathes in a pound and a half of dirt a year unless indoor air is mechanically cleaned.*—*John Croumyshield, Boston, Mass.*

TEN TONS OF PENNIES ARE WORTH ONLY $30,000!—*When the Ohio sales tax went into effect the Cleveland Federal Reserve Bank ordered ten tons of pennies, about 3,000,000 or $30,000 worth to meet the demands created by the tax.*—*Frank Bodine, Palmyra, N.Y.*

A SPONGE WILL HOLD MORE COLD WATER THAN HOT WATER!—*Cold water has greater surface tension than hot water, holding it in a sponge better than warmer water.*—*Conrad Dorsin, Scotia, N.Y.*

FREEZE WATER BY BOILING IT!—*Take the crystal of a watch and fill it with water. Place it in a vacuum bell-jar. As the air is drawn out the water will boil because of decreased atmospheric pressure. As it boils it liberates heat which is carried out with the air. When the heat is exhausted, the water suddenly freezes.*—*Rasil E. Smith, Muskegon, Mich.*

Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix and Inventions, 529 South 7th Street, Minneapolis. Source or proof of each Oddity must be given. Send all Oddities separately, not with other manuscripts or letters.

"Normandie," World's Largest Liner, Prepares for U. S. Trip

Top photo shows air view of France's $30,000,000 ocean giant, now nearing completion, being towed by tugs from her berth to make ready for her initial trip. Left—Note size of workers as compared with size of propeller and shaft of "Normandie." Weighing 75,000 tons, her super-b u l k displaces half again as m u c h as the "Leviathan."

THE *Normandie*, world's largest super-ship, recently was towed from her berth in preparation for her maiden voyage from France to the United States early in May.

As France's bid for oceanic trade and sea power, the huge passenger liner is so large that it was necessary to widen the Loire river and dredge the ocean bottom to Havre to accommodate the giant boat. The dining room is spacious enough to hold Columbus' fleet.

Eleven feet longer than Great Britain's *Queen Mary*, her nearest competitor, the *Normandie* has a length of 1,029 feet and a speed exceeding 30 knots. Her four turbines develop 160,000 h.p. Built at a cost of $30,000,000, the French liner has accommodations for 2,170 passengers, along with 165 chefs and 400 waiters who expect to serve an average of 10,000 meals a day.

While the *Normandie's* turbo-electric plant develops 40,000 h.p. less than the *Queen Mary*, it still would require 1,600 racing cars of 100 h.p. each to hold back the French monster.

Sail-less Boat Uses Gyro Blades

A SAILBOAT equipped with a gyro blade in place of canvas is the latest innovation in novel water craft.

Devised by E. Burke Wilford, Pennsylvania aeronautical engineer and builder of gyroplanes, the new boat carries one of the rotating blades atop its lone metal mast. Handling of the gyroboat is similar to manipulating the conventional sailing craft since the gyro blades are moved to various positions to take advantage of the wind. The duralumin blades pull the boat throught the water at an average speed of seven knots.

Just as the plane propeller pulls an airship through the skies so are the rotating blades seen above claimed to propel the gyroboat over water. The propeller is moved about like a sail.

Gun Takes Movies of Criminals

ONE of the world's smallest motion picture cameras, mounted beneath the barrel of an ordinary pistol, enables police to obtain an accurate photographic record of a criminal during a shooting fray. While the gun also shoots regular shells, it is particularly unique inasmuch as slight pressure on a camera trigger, located in front of the pistol trigger, takes a strip of 16 mm. movies before the gun actually is fired.

To obtain photographs of criminals O. W. Atkins, Los Angeles inventor, devised the above combination pistol which exposes seven feet of film before firing shot.

The camera mechanism is housed in a light-proof enclosure which weighs only seven ounces. A tiny lens projects beneath the barrel. Its speed is 16 frames a second.

MM's monthly ALMANAC

May 21, 1927. Capt. Charles A. Lindbergh made the first solo flight across the Atlantic, landing in Paris 33 hours and 29 minutes after leaving New York. In his plane, Spirit of St. Louis, he left San Diego on May 10, stopped in St. Louis, and arrived in New York on May 12. He took off May 20.

The MOON'S PHASES

	Day (May)	Time (E.S.T.)
●	2	4:36 p.m.
◐	10	6:54 a.m.
○	18	4:57 a.m.
◑	25	4:44 a.m.

SIGNS of the ZODIAC

TAURUS—THE BULL

GEMINI—THE TWINS

The sun entered the second sign of the zodiac, Taurus, on April 20, and enters third, Gemini, about May 20. Zodiacal constellations lie on both sides of ecliptic in map shown.

MAY 1, 1836, the first steamship on the Pacific Ocean reached Vancouver, B. C., from England.

May 6, 1840, the world's first postage stamp, the one penny black, illustrated below, was issued in England.

May 15, 1602, Capt. Bartholomew Gosnold, of Falmouth, England, landed near New Bedford, Mass., the first white man known to have set foot on New England soil.

May 18, 1930, the dirigible, Graf Zeppelin, left Friedrichshafen, Germany, on a flight of 21,000 miles around the world with a crew of 42 and 22 passengers.

May 18, 1919, Harry C. Hawker and MacKenzie Grieve, attempting a non-stop flight across the Atlantic, fell in mid-ocean but were rescued.

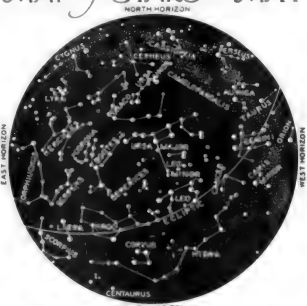
May 21, 1932, Mrs. Amelia Earhart Putnam was the first woman to make a solo flight across the Atlantic. She flew from Harbor Grace, Newfoundland, to Londonderry, Ireland, 2,026 miles, in 13 hours, 30 minutes.

May 21, 1931, Prof. Auguste Piccard made the first ascent into the stratosphere in a balloon, reaching an altitude of 51,778 feet.

May 24, 1844, Samuel F. B. Morse sent the first public message, "What hath God wrought?" by telegraph from Washington to Baltimore.

May 24, 1883, the Brooklyn Bridge was opened in New York City.

MAP of STARS in MAY



Map shows constellations as they appear at 9 p. m. on May 1. To use, face south, hold map upright with south at bottom.

The WORLD'S MOST

Eighty years before Lindbergh, the first non-stop flight across the Atlantic was reported. That blunder is no greater than other misleading tales that have fooled the world. Here are history's outstanding blunders and hoaxes.

by **H. H. SLAWSON**

BLUNDERS and hoaxes have embarrassed millions of persons, have changed the course of history, and have cost their victims millions of dollars. Science itself has been the cause of blunders. Early theories, that were accepted as fact, are still used to fool a gullible public and to sell stock in perpetual motion machines and schemes to convert base metals into gold.

In many cases newspapers have been the victim of hoaxes and blunders. The general attitude is to blame the newspapers for carelessness, but speed is so important to a highly competitive news gathering organization that little time can be devoted to checking back on stories.

One of the greatest journalistic blunders occurred in 1844 when a New York newspaper reported the sensational news of the first successful flight across the Atlantic. The story gave a very convincing account of the purported landing of a balloon near Charleston, S. C., after crossing the Atlantic from Europe in the astounding time of three days.

The story was sold to the newspaper by a writer in need of money who rushed into the office saying he had received the news by express riders from Norfolk, Va. The newspaper editors might have become suspicious because the longest flight on record up to that time was slightly more than 500 miles. But to check the story they would have had to go back to its source, Charleston, by sending fast riders from New York. Despite the swift communication available with the modern telegraph and radio, newspapers even today fall victim to hoaxes and blunders.

Probably the greatest blunder of modern times—and one of the most expensive—was the false report of the signing of the Armistice, ending the World War, on November 7, 1918. Although the Armistice was not officially signed until four days later, the entire United States was fooled by the report. Offices and stores closed, losing thousands of dollars

Dr. Frederick Cook perpetrated the greatest scientific hoax in history in 1909 when he announced that he was the first man to reach the North Pole. He showed the picture at left, supposedly taken at the North Pole, to the King of Denmark on Sept. 1, 1909. Above he is shown (at right) garlanded with roses on his arrival in New York City. Robert E. Peary exposed the hoax.

COSTLY BLUNDERS

in business, as millions of persons left their work and homes to take part in a wild demonstration to celebrate the end of the war.

An American newspaperman, Roy Howard, president of the United Press, was the unwitting instrument of the false report. He was said to have received the news from an apparently unimpeachable source, Admiral Henry B. Wilson, American naval commander at Brest, France.

Wilson, it is said, received the news from the American embassy in Paris and the embassy got it from an anonymous telephone caller, who falsely claimed to be speaking for the French Ministry of War. American newspapers, when actual signing of Armistice was reported, carefully checked truth of the story.

More recently the Associated Press was the

The false report of the Armistice on Nov. 7, 1918, resulted in the street jubilees and ticker tape showers shown above and at right in Wall Street, N. Y.

Most recent blunder was the false report on the Hauptmann verdict resulting in radio reports and extra papers such as those above in cities throughout the U. S. Mistaken signals over a radio receiving set caused an operator to send out the wrong verdict before the jury reported.

Inventions, June, 1935

April Fool Photo of First Man-Powered Flight Fooled U. S. Editors

source of a false report that for a quarter of an hour upset the entire nation. While millions of persons throughout the United States tensely awaited the result, great radio broadcasting chains and extra papers in more than thirty cities announced the startling news that Richard Bruno Hauptmann had been found guilty and sentenced to life imprisonment for the murder of the Lindbergh baby. Not until fourteen minutes later did the A. P. realize its report was wrong and send out urgent messages to kill the flash.

Newspapers which had issued extras on the strength of the false report hastily sent crews of men to buy back all copies, spending hundreds of dollars to keep the edition out of the hands of their rivals. Eleanor Medill Patterson, editor of the *Washington Herald*, paid $25 to a news boy for a copy of the *Washington Post*, carrying the headline HAUPTMANN GUILTY BUT ESCAPES DEATH, so that it could be reproduced in her paper.

Editors accepted the April Fool photo above as proof that man had successfully flown under his own power. The fake Cardiff giant at left, carved from stone in Chicago, brought the perpetrator $3,000,000 admission fees from a gullible public.

The story of George Washington and the cherry tree came from the imagination of a book peddler, who conceived the idea of telling people that Washington never told a lie to help sell his book on the life of the nation's first president.

One amusing incident of the false report was the action of the *St. Louis Globe-Democrat* which published an extra carrying two stories, one saying Hauptmann had been sentenced for life, the other to death.

That false report meant the expenditure of thousands of dollars for radio time and for the printing of extra editions that could not be used or had to be bought back from circulation. Oddly enough the radio was the cause of the false report. Because the courtroom was locked until the verdict had been announced and Hauptmann legally sentenced and returned to his cell, newspapermen at the trial concocted various schemes to get the verdict, as soon as it was announced, to confederates outside who would flash it to the world.

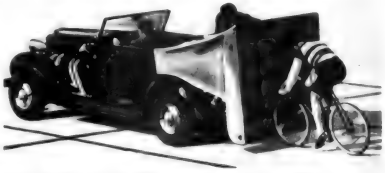
The Associated Press correspondent chose a small portable short wave radio transmitter hidden in a brief case. A system of signals was arranged with an operator at a receiving set in the attic of the court house. Unknown to the A. P. correspondent, the reporter for the *New York News* had made similar arrangements. While the jury was

[*Continued on page* 129]

Bike Racer Hits 100 m.p.h. To Set New World's Record

A NEW world's record was established in Los Angeles recently when Frank Bartell, veteran six-day bike racer, pedaling behind a streamlined windshield fastened to the rear of a fast-traveling car, skimmed over a one-mile course at an average speed of 80.5 m. p. h. Beating the previous record by more than four miles, 33-year-old Bartell was confident that he soon would surpass his present time.

The mile straightaway course was laid out on a concrete boulevard. Both auto and cyclist passed over the finish line at 90 m. p. h. and were said to be doing 100 m. p. h. before they slowed down.



Frank Bartell, Czechoslovakian cyclist, is seen above pedaling behind the novel wind break as he crossed the tape to smash all previous records.

Deaf Hear Through Finger-Tips

Prof. Robert H. Gault (left) demonstrates how his teletactor permits deaf subjects to hear through the skin.

AFTER eleven years of research, Dr. Robert H. Gault, psychology professor at Northwestern university, has perfected a device which enables the deaf to enjoy radio programs by hearing through their skin.

Known as the "teletactor," the machine works on the vacuum tube principle, like a radio. The receiver is held in one hand, while the amplified sound waves are transmitted to the finger tips through a vibrating disc.

Dr. Gault claims further that, as their skin grows more sensitive to sound vibrations, they will talk more naturally and improve pitch and emphasis in their voice. A pocket-size teletactor will soon be perfected.

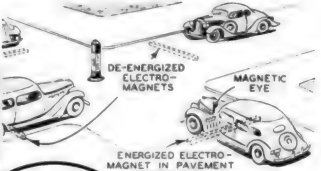
Odd Machine Harvests New Rubber

AN ODD-LOOKING machine is used in California to harvest a new variety of plant which produces rubber comparing favorably with the rubber tree product. The entire plant is uprooted and piled in long rows down the field. Then the plants are picked up by the harvester, shredded and blown into trucks which trail behind. Hauled to a nearby mill, the product is melted into 200 pound blocks of rubber. A high-powered fan sucks the shredded plants from the harvesting mechanism and blows them through a half moon-shaped chute into the truck box. The entire plant is used.

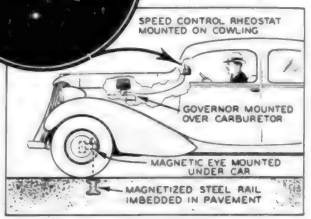
This queerly-shaped harvester shreds plants and blows them through arched chute into waiting trucks. The machine is used during the harvest of the synthetic rubber plants.

Robot to Stop Speeding Auto Menace

John J. Huebscher (left), of Minneapolis, Minn., conceived the idea for his auto speed control after an automobile accident three years ago, in which his son Robert (right), was seriously injured. Believing it possible to take some of the human equation out of driving, he developed and perfected a robot control which will regulate automatically the speeds of automobiles on the highways. The speed-regulating control, mounted just inside windshield of a car, is shown in circle at right.



In another application of Huebscher's device, electro-magnets imbedded in the pavement may be synchronized with stop and go signals to control traffic. These magnets could be made strong enough to operate another control and automatically apply brakes.



The three units of the system—magnet in street, magnetic eye on front axle, and speed control unit inside car—are the robots which can call upon the governor to reduce car speed.

APPLYING the railroad block system of control to automobiles, John Huebscher of Minneapolis believes he has found the "fool-proof" answer to the nation's constantly growing traffic death toll. Already experts of the federal bureau of roads at Washington have studied and approved the invention; Minnesota state highway engineers are making official tests on six department cars.

Permanently magnetized rails would be imbedded in the pavement wherever police authorities specify a certain minimum speed. Whenever a motor vehicle passed over the magnetized rail at too great a speed, a "magnetic eye" attached to the front axle would operate the speed control and governor, and throttle down the car automatically to a safe speed.

Attached to the cowling of the car, just inside the windshield, is the speed regulating device. A white light at its left glows while the car is traveling at the legal rate of speed for a certain road. The driver may boost his speed by moving an indicator, but just as soon as he is exceeding legal speed, a red light at the right of the unit, visible to anyone outside the car, announces his intent to go faster.

When entering a low speed zone, the red light would go out, and the car automatically and smoothly slow down to the minimum speed to which the device is set. The driver can move the indicator dial to higher speed again, as soon as he is out of the safety zone.

Although the control device was exposed in early tests, to show its operation more clearly, the inventor contemplates sealing it in an aluminum box, and connecting the speed control in such a way that any tampering would shut off the ignition and stop the car.

Positive operation of the device was obtained in tests with a distance of fourteen inches between the rail and the "magnetic eye." This would allow the rails to be buried several inches beneath the road surface, especially on graveled highways.

Huebscher has already spent $8,000 on the development of his invention, and hopes eventually to be able to install the complete unit on old cars for $15 each. The device would be installed on all new cars before they leave the factory. Laws would have to be passed making automatic speed control compulsory.

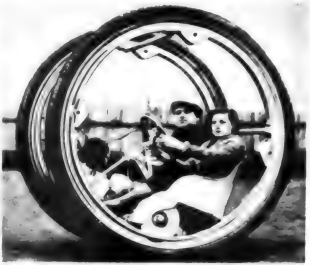
Gyro-Wheel Car Zooms Along On Giant Tires At 116 m.p.h.

RADICAL in design, a pleasure vehicle, known as the "gyrauto," has been introduced in Europe to replace the orthodox type of automobile in use today.

Designed by Ernest Fraquelli, young Italian engineer, the gyrauto is said to be capable of attaining a speed of 116 miles per hour and to operate at a much lower running cost than do more conventional cars. Seats, engine and all controls are suspended between two huge rubber-tired wheels which revolve as the car moves forward. There are accommodations for an extra passenger in addition to the driver.

The unusual piece of apparatus was demonstrated recently in Brussels, Belgium.

Fraquelli's unique vehicle is similar in general design to the Dyno-Wheel motor bus featured on the cover of this issue of MODERN MECHANIX AND INVENTIONS and described on page 87.



Ernest Fraquelli, Italian engineer, is shown above demonstrating his revolutionary motor car to a fair passenger.

Plans 900 m.p.h. "Flying Wing"

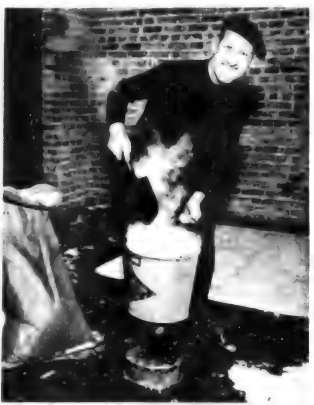
H. A. Nicholson, Los Angeles inventor, holds a model of his quadruple plane which has two motors, two rudders and four propellers. The wing-shaped craft will have a maximum cruising speed of 900 miles an hour.

A NEW type of airplane, equipped with two rudders, two motors and four propellers and fitted to carry 35 tons at a speed ranging from 500 to 900 m.p.h., was invented recently by a Los Angeles mechanical engineer experienced in marine and aeronautical fields.

The unusual craft, known as the "galleon of the air," will have an overall dimension of 50 by 100 feet. Driven by two 650 h.p. motors, the ship will be metal and glass enclosed. When the plane is completed, the inventor plans to make a non-stop flight around the world.

"Hot Ice" Turns Room Into Rink

EMPLOYING a heated mixture of chemicals which he paints on a wooden floor, Bobby McLean, widely known ice skating star, transforms the rooms of his home into an indoor ice skating rink. The material is heated over a blow torch. The surface of the rink may be renewed from time to time.



Bobby McLean, famous speed skater, applies a mixture of "hot ice" to the floor of a room in his Chicago home.

Cheating Death in DAREDEVIL STUNTS

by Captain Jimmy Jamison

Famous World's Fair High Diver

as told to Robert Faherty

POISE on a tiny perch atop a 100-foot ladder, only my toes holding me there during that breathless moment. I am facing the ladder with body rigid and hands on my hips. Below a flame flares ten feet high on the water in the little tank.

I fall backward, giving a slight push with my toes, and drop swiftly through the danger zone of guy wires. A second later I give a slight impulse to my body in the air, turn a complete somersault, then plunge straight down through the hot flame into five feet of water.

Captain Jimmy Jamison, right, reveals in this article how he and his fellow performers face death hourly to thrill public.

The manner in which a "human cannon-ball" is fired from the mechanical device seen above is explained herein. Zacchini, the human missile, is shown leaving cannon.

I hear women scream as I am dropping into the fire. They fear I have been killed. But I spring out of my tank like a seal, landing on a board level with the top of my tank. I am unhurt except for loss of eyebrows and hair singed off my arms.

The crowd is thrilled. I am paid well because the danger of my dive makes women scream. But it's all in the day's work. Making three or four such dives a day, I have cheated death for twelve years.

Spectators always ask me how I do it, and boys want to know how they, too, can become high divers. So I will tell readers of MODERN

Here is the story behind the men who gamble with life to provide a thrill-crazy public with sensational stunts. Few daredevils live long enough to tell about their experiences. Captain Jimmy Jamison happens to be a stunt man who did.

Above—Jimmy Terry, claimed to be the world's greatest slack rope walker, defends his reputation by assuming this precarious position and "strolling" leisurely among tall loop buildings, thirty-nine floors above Chicago's busy streets.

MECHANIX AND INVENTIONS secrets of high diving and of death-defying stunts by human flies, airplane daredevils, flagpole sitters, men hurled from cannons. I'll tell how a high diver gets that way!

It's dangerous work, but we daredevils utilize mechanical knowledge and scientific skill to keep on living.

For body protection I wear only an athletic supporter and rubber trunks extending up from the groin about twelve inches to guard internal organs. I make my trunks by cementing together portions of automobile inner tubes. Sometimes I wear an acrobat's suit of light silkalene to lessen the chance of being burned. I wear a rubber cap, and I use light

This action picture, taken at the recent World's Fair in Chicago, shows Captain Jamison, plunging head downward into a shallow tank of water 100 feet below. A second later he went into somersault and emerged unhurt from the tank amid cheers from the crowds. So hazardous is this leap through space that a strong wind or a poor takeoff can throw him off his path so that he will miss the tank completely. Bruises, severe headaches, black eyes often result from such dives.

Flagpole Sitting Atop Plane, Mid-Air Cycling Require Practice and Nerve

Looks easy, doesn't it? Even Alvin "Shipwreck" Kelly, famous flagpole sitter, who is seen atop the plane, will tell you that a stunt like this requires coolheadedness and plenty of nerve. Proper "rigging" is important to avert danger of serious accidents.

Here is a hair-raising thriller, performed by the much-heralded Allendas who combine their mid-air bicycling with juggling and other specialties. In this stunt the tire-less wheel rims grip the wire while weight of the bars provide necessary balance.

tennis slippers to give my toes a sure grip on the perch. Of course, a great deal of diving skill is necessary for a back somersault from 100 feet into a tank five feet deep and 14 feet in diameter. A perfect dive is essential to keep from being killed. Such training in diving should begin in boyhood.

As a boy, I did 60-foot back somersaults off an icehouse into a lake near Waterbury, Conn. In the navy I was captain of the battleship Wyoming's swimming team and often gave exhibition dives 80 feet off the ship. I trained for stunt diving by plunging from 120 feet off a bridge at Roanoke, Va. There I learned how to keep from going deeper than five feet.

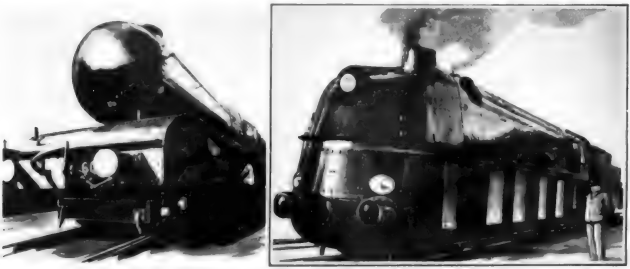
I kept the distance factor at a minimum by limiting the dive to a drop, easy enough if you're not afraid of altitude and have cool nerves and can keep perfect control of the body. The mystifying trick of going down only five feet is this: I double up, bringing knees almost to chin at the instant I am under water. I "slide" almost horizontally, converting the downward momentum into a horizontal propulsion.

A mechanical factor has helped my stunt diving, for a high diver's life depends on the perfection of his rigging. As a boy I learned some high rigging from steeplejack friends. As a boatswain's mate in the navy and as a working steeplejack later, I learned about ropes and cables, blocks and falls, how to use guy wires, how to judge strain in erecting high stands and scaffolds dependent on rope and wire.

Erection of my diving tower of eight 14-foot ladders is a tricky achievement of high rigging. When the first ladder is set upright on its base, four guy wires of seven-strand

[*Continued on page 135*]

Odd Streamline Designs Feature New Foreign Locomotives



Left—"King Henry VII," is England's contribution to locomotive streamlining. Right—Germany's two-miles-a-minute train. In a recent test this metal armored giant of the rails roared along at the remarkable speed of 110 m.p.h.

New Gadget Cuts Oil Consumption

This oil-saver prolongs life of motor and operates under adverse conditions by intensifying combustion.

A NEW motor device which is said to increase speed and reduce oil consumption has just been put on the market. When attached to the motor block in a recent test, the "propagator" increased the car speed 10 m.p.h. No oil was consumed in a 2,000-mile run. Without the device, a quart of oil was used in 75 miles.

Mechanical Mind "Remembers" Cars

THE latest invention to curb crime is an unique "remembering machine" which recently was introduced before the San Francisco police department.

According to its inventor, the licenses of cars wanted by authorities are punched out on a mechanical pattern. A police officer, stationed at an advantageous street corner, merely records on the six-rowed keyboard the license numbers of all cars that pass the intersection.

When a sought car is tabulated on the device, a light flashes and pursuit follows.

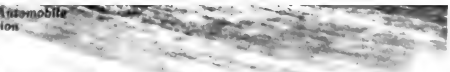
RADICAL in design, capable of roaring over the rails at heretofore unheard of speeds, Europe's new streamlined locomotives have just made their appearance in Germany and England.

A departure from the conventional engine, the English locomotive is bullet-nosed and shaped to slice its way through onrushing air currents. The train was given its first trial run following experiments of great secrecy.

The new German streamlined locomotive is completely cloaked with a heavy metal armor. All moving parts, including the drivers, are covered to within a few inches of the rails.

Herold Highstone (left) points out the features of his "remembering machine" to San Francisco's police chief.

National Dirt Track Automobile Racing Champion



Midget car racing has taken the country by storm. Already big city leagues of four-car teams are being formed and soon will invade America's principal cities. Above—A quartet of miniature racers hits a dusty turn on an outdoor track while tearing along at break-neck speed during an exciting race.

A LOW, sullen whine, intermingled with staccato putt-putts, increases to a mighty rumbling. A packed arena rises to its feet. With an incredible, majestic roar these mites of automotive ingenuity flash past the line of vision like death-dealing darts.

Your blood tingles, for motor racing has the knack of getting into a man's blood through his ear drums. Couple this ominous roar with man's urge to conquer time in the face of death and you have something more than a sport. You have something that speeds the pulse and leaves you in goggle-eyed awe.

Little wonder that indoor midget automobile racing, which began in Chicago, has spread like wildfire to New York, St. Louis, Milwaukee and Hollywood, packing arenas from coast to coast.

The story of Sir Malcolm Campbell's thundering defiance to split seconds at Daytona Beach is familiar to everyone. Every device known to the automotive science is placed at the altar of speed and we do not wonder that this puffing giant can do also 300 miles an hour.

But what of the midget car with the "coffee grinding" motor and the "cracker box" frame? Here is motordom's contribution to scientific simplicity. Impish in design, stripped of foot-brakes and other gadgets so necessary to racing, these midgets streak through space at 75 miles an hour on indoor tracks, easily capable of doing 140 miles an hour if turned loose outdoors.

As for general specifications, the Midwest Auto Racing Association declares that the

Henry Bergeron, midget racer, is seen at the wheel of a "pusher-type" car. Successful mastery of the short-track technique demands skillful handling on the indoor turns.

BECOMES BIG-TIME SPORT

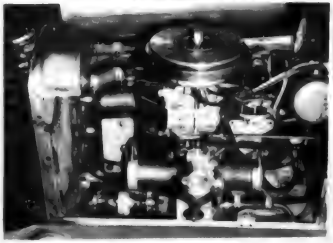
Lining up for the start of an exciting race on an indoor track. Note the planted retaining wall which affords protection to drivers and spectators and permits skidding cars to bounce out of danger. The surface of the track *is* neither hard nor soft, consisting only of clay and sand.

wheelbase must not exceed 66 to 76 inches. There is no limitation as to the length of the car, but it must be at least 108 inches long. The weight ranges from 550 to 850 pounds.

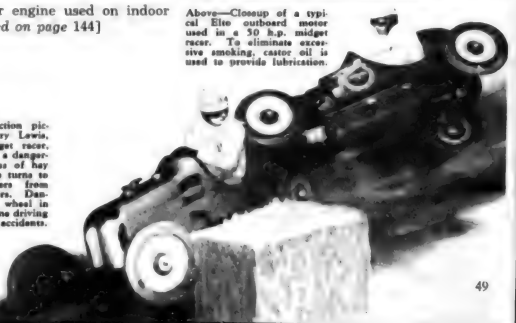
Super-chargers may be placed on 4-cycle motors of less than 60 cubic inch displacement and on 2-cycle motors of less than 50 cubic inch displacement. The specifications for non-supercharged motors require not more than 85 cubic inch displacement in 4-cycle engines and 61½ cubic inch displacement in 2-cycle motors.

The most popular engine used on indoor

[*Continued on page* 144]



Above—Closeup of a typical Elto outboard motor used in a 50 h.p. midget racer. To eliminate excessive smoking, castor oil is used to provide lubrication.



This unusual action picture shows Harry Lewis, well-known midget racer, about to spill on a dangerous curve. Bales of hay are placed at the turns to prevent speedsters from cutting the corners. Danger rides at the wheel in every race, but none driving eliminates serious accidents.

Wind Gauge Halts All Bridge Traffic When Gales Increase

When the anemometer warns of high-velocity gales, trains do not cross this English viaduct. Wind gauge is seen above.

WHEN gales reach a dangerous velocity on the Straithes viaduct near Whitby, England, a wind gauge located on the edge of the bridge tolls a bell to warn railroad traffic that the viaduct no longer is safe for crossing.

The unique instrument which controls the warning signal is an anemometer for determining the force of the wind. Mounted atop a single column, a vane-like device keeps the face of the disc into the breeze. The disc does not revolve but responds to wind pressure.

During a recent gale the bell tolled for the first time and rail traffic temporarily halted.

Airplane Motor Uses Auto Parts

AN INEXPENSIVE, light-weight airplane motor, constructed largely from Ford auto parts and completely equipped with electric starter, battery and generator, will be placed on the market soon by a California firm. Weighing only 170 pounds, the four-cylinder motor will have a cruising speed of 90 m.p.h., a top speed of 110 m.p.h. and a landing speed of 40 m.p.h.

H. L. Hammett, co-inventor of the featherweight airplane motor, is shown above lifting the engine which passed government tests. Crankcase permits propeller ground clearance.

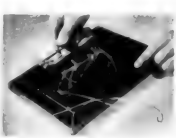
Odd Vehicle Has 4-Wheel Drive

Equipped with free-wheeling and a 4-wheel drive, this unusual car can be steered sideways, in circles and parked in small space. It is operated by a steering wheel and handy levers.

A "DANCING auto" with a four-wheel drive, capable of performing more stunts than a circus clown, has been patented by a Michigan auto mechanic. The car can be steered by the wheels at either end, or either end may remain stationary while the other end is driven around it. Both front and rear wheels can be steered in opposite directions so that the car revolves in a circle. Manipulated

Low-Cost Hand Router Invented

SIMPLE and practical, a new hand router which purports to duplicate the work of higher-priced power machines has been devised. The tool is easy to operate and especially adaptable to inlay work. Dull blades may be resharpened with emery paper.



The new hand router, inexpensive and easily handled is shown in operation. It is suited for inlaying.

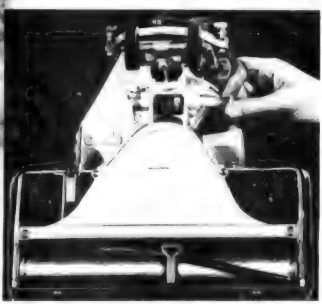
CREAM-MAKER

Among Newest Home Aids

BOTTLE-HOLDER now on market enables baby to feed himself without danger of dropping the bottle. Made of aluminum, the broad circular base makes the unit secure even on uneven surfaces such as pillows. The bottle is held in a pivoted sleeve which may be tipped to almost any angle which may be needed.

CREAM-MAKER converts mixture of butter and milk into real cream by emulsifying butter fat, mixing it thoroughly with the milk. Ingredients are placed in the aluminum bowl, and the lever worked up and down like a pump handle. Cream is forced out of spout at bottom of unit.

MOP-HANDLE which has a flexible joint can be bent around corners, to penetrate nooks and corners otherwise hard to reach. The mop may be set at any desired angle



PERFUME UNIT (right) for any vacuum cleaner sprays fragrant perfume to conceal dusty odors when cleaning. Bottle containing desired odor is inserted in special socket built into bottom of appliance. Valve on bottle controls amount used. In photo, hand is on valve of the bottle

New Streamlined Bus Has Diesel Motors in Front and Rear

Above—Artist's drawing of Germany's new 44-passenger streamlined bus which will soon be put into service on the Reichs highway now being built. A Diesel motor is found behind its bullet-shaped nose and another inside of the rear end. Left—Manner of mounting engines on bus chassis.

A NEW type of streamlined motor bus, equipped with engines in front and rear, will be introduced for the first time on the new Reichs auto road now under construction in Germany.

The 44-passenger bus, capable of attaining a maximum speed of 75 m.p.h., is driven by two 140 h.p. Diesel engines. Among the mechanical improvements are pendulum rear axles, which correspond to the knee action found on American cars. The principal difference lies in the addition of a stabilizing middle spring. Automatic free wheeling and syncromesh gears are also found in the German vehicle.

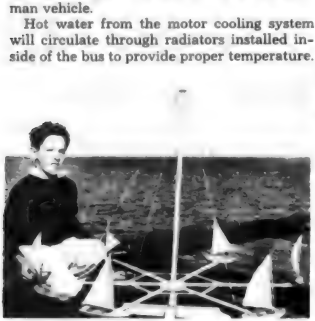
Hot water from the motor cooling system will circulate through radiators installed inside of the bus to provide proper temperature.

Roadside Stand Shaped Like Pig

This pig-shaped food-vendor along one of Hollywood's streets provides the sight-seeing motorist with much amusement.

CALIFORNIA boasts of many oddly-shaped roadside stands, but no more unusual eat-shop exists than Hollywood's "Laughing Pig." Ears, snout, mouth and legs are fashioned in the concrete structure. Windows and doors open on each side of the house, while a radio set and "observation platform" are found beneath the roof of the pig's mouth.

Toy Shows Wind Effect on Sails



Young Bobby Cram, above, devised this unique weathervane. Model boats are fastened to extension arms which revolve.

THE effects of wind upon sails can be studied with an odd weathervane recently designed by a Santa Barbara, California, youth. First considered merely a toy, the device has won the attention of veteran skippers who find that as the tiny boats revolve slowly in a wide circle, conditions actually encountered on a regular sailing course are reproduced faithfully. Experts believe that, by the help of this toy-like weathervane, sailing problems will be solved.

California Fair Recreates AZTEC Palaces

Hanging garden decorations of Aztec architecture mingle with products of modern machine age in palace of Travel and Transportation at San Diego

LOST to civilization for more than five centuries, the colorful Aztec palaces with their hanging gardens will be recreated for visitors at California's $10,000,000 fair, opening May 29 at San Diego.

Examples of Mayan and Pueblo architecture will also have prominent places in 1,400-acre Balboa park, site of this California Pacific International Exposition. A colorful, glamourous picture of the architectural development of America will be presented by the many buildings.

Vines and flowers, rather than paint, will supply decorative color. Semi-tropical plants provide orange and yellow, and trailing lantana, a vine blooming the year round, gives a glorious lavender hue to the palace of Travel and Transport.

Daytime lighting will be obtained from windows hidden behind outer walls. At night ever-changing floodlights, coming from holes cut in the parapets of each building, will bathe the exposition site in rainbow hues.

Old and heavy though they may appear, two men can lift the largest of decorations in the exposition. Skillful application of paints and cements on wallboard by Juan B. Larrinaga, architect and designer, create the "antiquity" of the decorative scheme.

Richard S. Requa, supervising architect, studied examples of America's prehistoric architecture first.

This early Spanish-Colonial entrance with patio leads into one of the Exposition's largest exhibit buildings.

Unique features of the fair's amusement zone are "Golden Gulch," mining town of '49 (above), a Midget City and Farm, and the famous San Diego zoo. Stage coaches and pack mules will carry amusement seekers over rocky trail to "Last Chance".

REBUILDING Human Bodies

A man of miracles is the modern surgeon. When nature errs, omits vital organs, leaves others topsy-turvy, he rebuilds with surgical tools on the operating table—he creates new life, brings new hope.

Photo—Courtesy Operay Laboratories, Inc.

To provide light for an operation, the modern surgeon uses a single 1,000 candlepower incandescent lamp surrounded by seven lenses and mirrors, all forming a common focus of illumination, to give light without heat, glare, or shadows. Light is mounted on swivel, for instant adjustment. At left is typical modern operating room scene. Gauze masks and rubber gloves are worn to safeguard patient against bacteria.

MARY ERWIN was slowly dying. Her enlarged heart, pressing more and more against the ribs, could not beat normally. In a Kansas City hospital surgeons operated on the 15-year-old girl, removing three of the ribs to save her life.

Herbert Miller lost his left hand and the right arm above the elbow in a Norwichtown, Conn., accident. Attempting to provide mechanical fingers which can be controlled by muscles of the now useless arms, Dr. Kessler, Newark, N. J., orthopedic surgeon, operated. He punched a hole in the stump of the left arm, lined it with skin, pulled through the flexor muscle cords, fastened them in a loop, and encased them with skin. Later these muscle cords will be attached to levers in an artificial mechanical hand now being made in Germany.

At the disposal of 6-year-old Wallace Rossal of Glendale, Cal., are all the benefits of modern surgery. Though rugged in health, Wallace has only one lung, a heart that is on the wrong side, and intestines in the left chest cavity. X-rays revealed the topsy-turvy condition of his body; now doctors plan to operate, to bring his vital organs into normal position.

With successful operations for an inverted stomach already to his credit, Dr. P. E. Truesdale of Fall River, Mass., offers to perform the same operation on 13-year-old Jimmy Neilson. Other surgeons in every corner of the world are rebuilding human bodies daily on the operating table, to bring new health, new happiness to persons who but a generation ago would have been given up as hopeless.

"And speaking of operations—," it wasn't so long ago that we considered them serious—

by **BOB GORDON**

on the OPERATING TABLE

Doctors studied 6-year-old Wallace Roosa with fluoroscope shown above, found internal organs in topsy-turvy condition as in X-ray photo at left. They are planning to operate.

a life-time subject for conversation. The casualness with which surgery is accepted today is proof that another miracle of science has been performed—that man has lost his fear of the knife and the operating table.

Not only is the nonchalant attitude apparent in the sitting room, but in the operating room itself. Patients now read newspapers or chat with nurses while undergoing abdominal operations made painless by modern pre-operative treatment.

Ether, our first anesthetic, is rapidly passing out of the picture. It produces deep intoxication, chemically injuring every tissue and organ of the body, so that the patient has to recover not only from the operation, but from the effects of the anesthetic as well. The nauseating after-effects of ether often cause violent contractions of abdominal muscles which should have absolute rest after being

This midget version of the Drinker respirator, machine designed to give artificial respiration by vacuum method for long periods of time, is used to start breathing in new born babies.

Doctors Use Radio Waves To Create "Artificial Fever" In Lame Muscles

Oxygen tent shown at left weighs but nine pounds. Since oxygen is heavier than air, tent may be left open at top to give food and drink to patient. In upper photo, radio is being put to a new use, in curing lame muscles or stiff joints. Coiled wire sends ultra-high frequency currents through body to produce artificial fever to combat ailments in the affected parts.

under the knife. Chloroform also poisons the entire body, often causing death during the operation by stopping the heart.

The lighter gaseous anesthetics, nitrous oxide and ethylene, damage the body but little in comparison. They unite with the red blood corpuscles and produce unconsciousness by stopping the movement of oxygen to the brain.

Shortening the coagulation time of blood, these gaseous anesthetics are useful in the removal of tonsils, and other operations where it is difficult to control bleeding.

Most of the up-to-date hospitals now use a system of combined anesthesia and preoperative care called anociation. Recognizing the effect of the emotions on every organ and cell of the body, the effects of worry and fear are eliminated by intelligent nursing, the judicious use of morphine, nerve blocking, and harmless anesthetics. The patient comes into the operating room rested and calm. An injection of neocaine or spinocaine leaves the lower part of the body without feeling, while the heart, brain, and breathing organs are free to function normally. Nitrous oxide or ethylene are at hand to be administered if required.

The Lakeside and Cleveland Clinic Hospitals, which use anociation, report only three anesthetic deaths out of 120,125 operations. The Public Health Service Hospital in Baltimore has a mortality rate of only six tenths of one per cent for appendicitis operations, where at the turn of the century only one person in five survived an abdominal operation.

What perhaps impresses the layman most on his first visit to an operating room is the scrupulous cleanliness. Not many years ago a doctor expected what he called "Laudable Pus" in a surgical wound, and was delighted if no other form of infection appeared. Now a surgeon looks upon any kind of post-operative infection as a personal disgrace. In 1867 Lister introduced antiseptic surgery, in which bac-

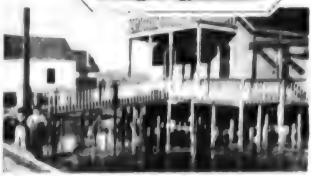
[Continued on page 125]

Earth Fill to Level "Town On Stilts"

Above—Typical scene at California's "stilt town," showing 12-inch pipe in foreground emptying a liquid "fill" pumped from a river a mile away

Car Victim Expands Like Balloon

CHEST wall and lung punctured by broken ribs, a New Jersey accident victim recently became a human balloon when air leaking from lung to tissues caused his body to expand to almost twice its size. A physician punctured the patient to release the air.



Top—Hydraulic dredge employed in sand sucking operations. Lower—One of the overgrowned homes in Collinsville where, for over 75 years, lawns, gardens and trees were unknown

Fire Chutes Aid In Rescue Work

TO SAFEGUARD lives of patients in case of fire, unique outside chutes have been erected which lead from the upper floors to the ground of a New York hospital.

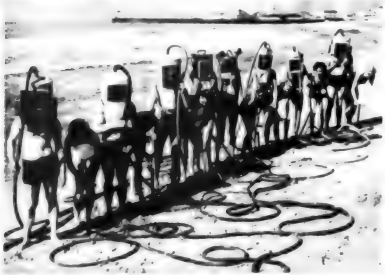
This fire escape for cripples and invalids is installed at the Jewish Memorial Hospital in Brooklyn, N.Y. Closeup of chutes through which patients slide to safety

CALIFORNIA'S novel "stilt town" soon will relinquish its claim to uniqueness. The federal government recently ordered more than 800,000 yards of sand and mud pumped from the Sacramento river into the salt swamp over which Collinsville is built. The fill will be made to the sills of the houses.

A large hydraulic river dredge is being used in the operation. Sand is sucked up from the river bottom at one end of the dredge and forced by giant pumps through a mile of 12-inch pipes to the swamp. Here the muddy water drains away into a slough, leaving the heavier deposits behind.

Since 1859 Collinsville has been a town on stilts. Nearby rivers and bays were valued as salmon fishing grounds, and it was here that the first fish cannery on the Pacific coast was built. The 200 remaining residents of the town are descendants of the first "squatters" and still carry on traditions of the past.

"Suicide Club" Makes Own Diving Suits



San Pedro High School youths with diving suits made from odds and ends.

THE "Suicide Club" is an apt title for a group of eight Californian youths who, assisted by friends at the air pumps, indulge in small scale deep sea diving.

Under the direction of Jack Cheaney of the Los Angeles playground department, the amateur divers have equipped themselves with complete homemade outfits constructed from odds and ends. Sections of water heating tanks, fitted with windows, provide suitable helmets for the sub-surface workers. Ordinary garden hose is attached to bicycle pumps which furnish up to 20 pounds of air pressure.

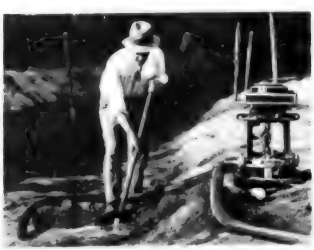
Salvaging sunken craft, retrieving lost anchors and freeing fouled lines are the everyday jobs of this venturesome group.

Pirate Treasure Reported Found

TWO million dollars in pirate gold was reported to have been found in a rusty iron chest by a boy beach-combing on Santa Margarita Island, 600 miles south of San Diego. The treasure chest was so heavy that nine men were needed to lift the box.

Pond Dug With Sand-Sucking Pump

A PROPELLER-LESS outboard motor, connected to a centrifugal gasoline pump, has been used for digging out ponds by the method commonly knows as "sand-sucking." Because of the sandy ground, a tractor was employed for preliminary surface digging in the case below. When the water table finally was reached additional depth was obtained by pumping out the sand and water together.



Digging frog pond with centrifugal pump. Water level is maintained, but pond must be fertilized for proper plant growth.

New Flag Pole Has Tilting Base

A steeple-jack isn't necessary to make repairs on the tilt-type flag pole. One hand will lower the staff to the ground. Actual installation of the pole can be accomplished easily within two hours.

A TILTING flag pole, equipped with a counterweight base which permits one man to lower the staff to a horizontal position, is now being marketed by a Chicago manufacturer. In vertical position, the counterweight rests in a tilting fixture, securely locked to the bracket supports on the base. By removing the locking bar and pressing the foot against the counterweight, the pole can be brought to the desired position by hand for repainting or repair work.

Study Fish Scales With Your Microscope

Above — Carp scale (cycloid) magnified 15 times. Below—Ctenoid scale from perch. Note comb-like fringe.

Like tree rings, the fine concentric lines on the scale of a fish, examined under a microscope, reveal the specimen's age, one line for each year. Scales are protected by a very thin skin covering.

Right — Placoid scales from shark, magnified 55 times. Note the delicate design of the skin of the shark which was first to wear a scaly coating. Scales, which really are bone, are forerunners of animal teeth.

by JULIAN D. CORRINGTON, Ph. D.

AS A bird may be told by its feathers and a mammal by its hair, so a fish is known by the possession of scales. Because these body coverings reveal amazing facts regarding the life and ancestry of certain fish types, they hold much interest for the microscopist.

Of all animals, only fish have a clothing of bone scales, whereas the so-called scales or "scutes" of snakes and other reptiles, are composed or horn, as are feathers, hair and nails. Scales are produced by the deeper of the two layers of the skin, the *dermis*, but horn is manufactured by the upper layer, the *epidermis*. Bone is living, while horn is lifeless.

Most people think that a fish's scales are on the extreme outside of the body. But these animals have a very thin epidermis. This layer secretes the slime coating which protects the fish from bacteria and fungus growths.

Making slides of fish scales is simple. Merely pull off a scale or two from any victim at hand, grasping the scale with a forceps and giving a quick yank. If the fish is a pet, moisten the hand or cloth by which it is held, otherwise a dry surface will remove the slime and deadly mold will form. Do not remove more than one or two scales from any one such fish.

You can mount a scale in two or three drops of water, put on a cover glass and study under the microscope. Use a very low power and cut down the light. If you wish a permanent slide, place the scale in 95 per cent alcohol for two or three hours and press to prevent curling. Remove alcohol with a pipette and replace with xylol for another hour. Then

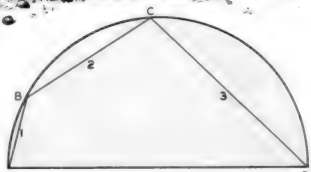
[*Continued on page* 132]

Win 27 PRIZES in NEW Contest;

$25.00 cash and fifteen extra prizes, your choice of any one of the famous MM shop blueprints listed below, are offered this month to those who can solve three simple, but tricky, algebra and trigonometry problems.

No. 1. THE SALARY PARADOX. A university graduate is hired at a salary commencing at $1,500 a year, with the stipulation that he is to receive a raise of $200 every year. A high school graduate is hired by the same firm to start at the same salary of $1,500 a year, but he is to receive a raise of $50 every six months. If both men start working at the same time, and are paid for their services every six months, which one will have made the most money at the end of a five-year period? Give reasons for answer and method of solution.

No. 2. MONKEY MANEUVERS. One monkey runs up one side of a cocoanut tree and down the other side in forty seconds. Another monkey traveling the same route in the opposite direction meets the first monkey every eighteen seconds. The second monkey moves at the rate of eleven feet per second. To make things more interesting, the first monkey tosses a cocoanut to the second monkey each time the second monkey has traveled 36 feet. If the second monkey muffs every other cocoanut pitched by the first monkey, how many cocoanuts will second monkey catch in one hour?



No. 3. FOR TRIGONOMETRY FANS. Three lines, whose lengths are in the proportion 1:2:3, are drawn inside a semi-circle as shown above. What is the radius of the semi-circle?

BEWARE of pitfalls in tackling this month's trigonometry problem. It's not quite as easy as it may appear at first glance, but not too difficult for anyone who has studied elementary trigonometry. Here's a tip for No. 2: By setting up a proportion involving times, find how long it takes the second monkey to go up and down.

For the simplest and most accurate solutions to all three of the problems, MODERN MECHANIX AND INVENTIONS offers the following cash prizes: First prize, $10.00; second prize, $5.00; and ten third prizes of $1.00 each. In addition there will be fifteen fourth prizes, your choice of any one MM shop blueprint listing at 75c or less. When sending in your solutions, indicate which one of the following plans you prefer, in case you are winner of a fourth prize:

Canoe Sail, Diving Helmet, Outboard Hydro Racer, Rustic Fireplace, Wind Power Generator Unit, Arc Welding Generator, 6-Tube Auto Radio, 2-Tube Portable Radio, 5-Meter Transceiver, Short Wave Converter, Midget Auto, Auto Supercharger, Governor Winthrop Desk, and Table Top Railway Locomotive.

Descriptions of all MM blueprints are in the 1935 blueprint booklet, given free to those sending a 3c stamp to cover postage.

Your entry should be postmarked before June 20, 1935. Decisions of the judges will be final, and no entries can be returned. In case of ties, duplicate prizes will be awarded. Answers to these problems, with the names of the winners, will appear in the September issue.

Employes of this magazine or their relatives are not eligible to compete. You do not have to buy a copy or be a subscriber to enter. Address June Puzzle Contest, MODERN MECHANIX AND INVENTIONS, Minneapolis, Minn.

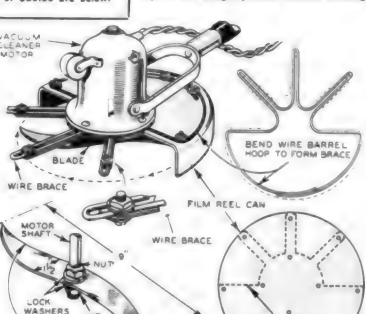
GADGETS Bring $125.00 CASH

Here are the winners of the $125.00 in cash prizes in the March, 1935, Home Mechanics Contest, the last in a series offering to readers of **MODERN MECHANIX AND INVENTIONS** a total of $500.00 for home improvement ideas.

The winning entry, an electric hedge trimmer which can be built for less than $7.00, even if all parts are purchased, was submitted by Bradley Brewer. The plans and specifications for which he received first prize of $60.00 are below.

Pivoted handle makes trimming of sides and tops of low hedges possible without bending.

Either regular vacuum cleaner handle or broomstick can be used. With long pole handle shown above, branches fifteen feet high can be reached. Experiments will show just how thick a branch can be handled without bending guard. Details of construction are given in the diagrams at the right.



by **BRADLEY BREWER**

WITH this electric hedge trimmer, made from a vacuum cleaner motor and a few odds and ends, a hedge five feet high, four feet wide, and ninety feet long can be trimmed neatly in less than one hour.

Use a small, light electric motor which is powerful, speedy, and has a long shaft. Thread one end and fasten on the cutting blade, which is made from tough sheet metal or tempered steel. It is the speed of the blade, rather than its hardness or sharpness, that does the work, so you can cut one out yourself with tin snips. The guard is the cover of a movie film reel can, cut to the shape shown and braced with stiff wire. The blade should be mounted so that the concave side does the cutting. Tighten the blade well and keep it tight, for it can do considerable damage if it comes loose.

MARCH CONTEST WINNERS

The following entrants in the March Home Mechanics Contest have been selected by the judges as winners of the $125.00 in cash prizes offered for designs for mechanical devices having some use about the home:

FIRST PRIZE, $60.00: Bradley Brewer, Los Angeles, Cal. His electric hedge trimmer is described on this page.

SECOND PRIZE, $20.00: Melvin A. Noecker, Courtenay, N. Dak.; heavy duty bandsaw.

THIRD PRIZE, $8.00: Harry B. White, Shreveport, La.; high speed electric grass cutter.

FOURTH PRIZE, five of $5.00 each: Norvin Rabo, Crete, Ill.; small bandsaw made of wood; Dr. C. R. Griffen, Sioux City, Iowa, drill press made from auto parts; H. Olssens, Cleveland, Ohio, cold-air refrigerator for winter use; Hayden Hargett, Florence, Ala., electric water heater; C. G. Wells, Paoli, Colo., fire extinguisher.

FIFTH PRIZE, six of $2.00 each: Earl Goddard, Mesilla Park, N. Mex., electric ice cream freezer; L. S. Schaufele, Alameda, Cal., changing hand saw into power saw; Clifford M. Jones, Cottage Grove, Ore., heavy duty power saw for wood or iron; F. Wayne Thompson, Dunsmuir, Cal., low saw; Phoebus Ch. Lessios, Salonica, Greece, electric phonograph turntable; Kenneth Swigart, Wineham, Ohio, power hacksaw.

Box Car With Rubber Wheels Travels on Highway or Rails

Intended to eliminate rehandling of freight, this box car moves over tracks or road. Frank Ferrin, inventor, examines his odd model.

FREIGHT handling methods will be revolutionized if plans for an unique "semi-rail" car, recently designed by Frank Ferrin, of Minneapolis, are adopted.

The car resembles the railroad box car of today, except that midway over the rear trucks a set of tire-covered wheels are suspended. As the car moves over the rails, the rubber wheels do not touch the road bed. When the freight reaches its destination the car, riding on its rubber wheels, is pulled up an incline, thus leaving the metal wheel carriages on the rails below.

The box car is then fastened to a 4-wheel trailer-truck which transports the load over highways or country roads to the receiver of the shipment.

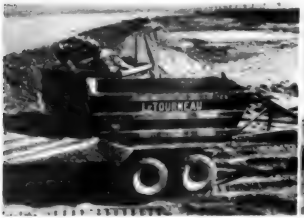
Box Slides Back to Dump Truck

AN AMAZING piece of earth-moving equipment is a new dirt truck, devised by a California contractor and having a capacity of 25 cubic yards. At the touch of a lever, the box of the truck slides backward and the load is dumped. The wheels are equipped with giant, doughnut-shaped pneumatic tires to give greater traction. Such trucks run on eight rubber tires, each 20 inches in diameter. Using such trucks, the inventor claims that he is able to deliver more yardage at greatly reduced costs.

Exploding Sign Holds Attention

A NEW action sign that explodes like a rocket only to resume its former shape has just been devised. The surface of the sign board is made up of a number of oscillating discs, closely grouped and mechanically operated in such manner as to cause simultaneous movement or "explosion" of the discs through a 25 degree arc. As the discs return to normal, the sign is legible once more.

Upper photo shows sign "exploded" by movement of discs on surface. Lower photo reveals normal position prior to scattering.



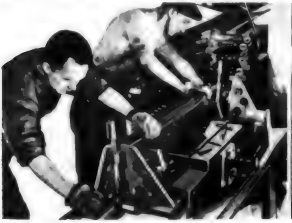
Left above—One of a fleet of unique earth-moving trucks used in California for hauling dirt or rocks. Note the unusually large size of the tires. Right above—To dump a load, the truck's box does not tilt but moves straight back off chassis.

Building KNEE ACTION Into CHEVROLET

Gigantic machines alongside a two-mile conveyor line stamp out, punch, weld, and finish knee action units for Chevrolet. Dozens of rigid tests insure a unit capable of withstanding and smoothing out road shocks at high speeds. Follow through this interesting manufacturing process.

The giant press shown above is just one of many which take 5/32" steel sheets and form them, step by step, into the two halves of the knee action housing. The 15 stages of manufacture preliminary to welding are shown just below. Metal flows into shape like clay in Chevrolet's huge machines.

Quick-acting clamps seal all openings in an assembled housing, permitting under-water air tests for defects in weld which show up as leaks. Air under 15 pounds pressure is used in the above machine, which makes the tests. Mounted on a counter-balanced arm, the fixture and housing can be submerged and raised with ease. Bubbles indicate defective unit.



Jigs like this make possible speedy but accurate testing and inspection of the king-pin support, a part of Chevrolet's knee action front axle. Workman is using close-fitting gauge pins, which check the inclination of the holes. Dozens of other tests must be passed before a knee action unit receives a final okay.

Eight of these powerful electric arc welding machines, designed especially for Chevrolet, join together the halves of the knee action housings. Cams turn the pieces, bring the edges of the halves in contact, and control the size of the welded piece. A continuous, air-tight welded joint is obtained as timing of machine is automatic. Workman above is inspecting a finished right-hand housing.

Is The Brooklyn Bridge

Will this suspension bridge, pride of New York for 51 years, crash into the East river, carrying with it the hundreds of passengers in the trains and autos that pass over in an endless stream? The city is considering plans for rebuilding the famous old bridge.

A crew of 100 men have been assigned to the Brooklyn bridge, to inspect continually for further signs of failure, and to keep the gigantic "patient" of Commissioner Kracke in trim condition. Here men are cleaning and painting the steel elevated structure between the two roadways of the bridge. Other men inspect continually.

THE world's most famous bridge is tottering! Members of New York City's engineering staff recently told a representative of MODERN MECHANIX AND INVENTIONS that unless certain drastic repairs and improvements are executed in the near future, it is not unlikely that the Brooklyn Bridge will be the scene of one of the worst catastrophes in history.

The 51-year-old structure, which was heralded as a magnificently solid achievement a half century ago, has succumbed to the ravages of time, storms and strains. Although the bridge's dilapidated condition has been kept secret for almost ten years, its inherent and apparent perils have become so obvious of late that Frederick J. H. Kracke, Commissioner of the Department of Plants and Structures, has confessed to the span's weaknesses and potential dangers.

Commissioner Kracke, whose department has jurisdiction over New York City's bridges, has taken under advisement a plan to reconstruct the Brooklyn Bridge which was submitted to him by the internationally famous bridge engineer, D. B. Steinman.

Mr. Steinman's plans call for reconstruction with a new aluminum alloy which would make the bridge impregnable for another 500 years. The Steinman design calling for a double-decker roadway would replace the present single level structure.

"This renovation," Mr. Steinman explained, "with the massive superstructure which would multiply the present capacity more than six times, would cost $8,250,000. This amount will provide the equivalent benefits of a new bridge costing $40,000,000.

"Under my present plan for 12 ten-foot traffic lanes, the elevated and street car lines would be eliminated. The massive towers and cables would be left intact, but all steel in the bridge proper would be replaced with a light, durable, non-corroding alloy of aluminum.

"First hand observation concerning traffic on the Brooklyn Bridge showed that it does not collect the vehicles properly, that the approach as it is today is outmoded and impractical.

"Wayfarers would be safe on the proposed

Falling Down?

by ALFRED ALBELLI

New York City's first suspension bridge, built 51 years ago, is succumbing to the ravages of time, storms, and strains. A crew of 100 men stand guard daily, watching for further signs of weakness. Heavy trucks are diverted to other bridges. Will it give way—crash into the East river?

Commissioner Kracke proposes a general overhauling of Brooklyn bridge, to make it safe for another generation. Steel in the roadway would be replaced with new structural aluminum alloy to form a double deck structure providing 12 traffic lanes, but no elevated or street car lines. Elevated tracks and walk for pedestrians are in center of bridge at present.

new bridge. The present anchorages and cables would be made to last for another 500 years. As the present value of the total cable pull acting on the anchorages will not be increased by the load of the projected structure, except possibly by a slight amount under extreme concentration of load, the anchorages will safely serve the proposed structure without reinforcement.

"I have examined the anchorages and computed the pressures. These pressures are safe. They have, moreover, existed for half a century, and the anchorages have safely withstood them. The steep angle of the resultant precludes any possibility of sliding.

"In the approaches, where weight is not an important factor, structural steel would be used instead because of its lower cost. The foundations and masonry superstructure in the approaches are used in the new design."

Commissioner Kracke further explained, "By reconstruction of the Brooklyn Bridge I mean a general overhauling which would allow us to stop babying it. It's an old, old bridge, you know, the first of the suspension bridges put up by the city, and we have had to take care of it for a long time.

[*Continued on page* 130]

PARAGRAPH ODDITIES OF SCIENCE

THE speed of sound is ten times faster in ice than it is in air. The rate of travel in ice is approximately 11,000 feet per second, whereas sound in air averages only 1,090 feet a second.

Horned toads, found in arid regions in this country and Mexico, occasionally defend themselves when provoked by spurting blood from the corner of the eye to a distance of more than a yard.—Lyman T. Williams, Omaha, Nebraska.

The radius of the earth is increasing about one-eighth of an inch every 100 years due to the fall of cosmic dust.—William Spurgeon, Patoka, Ill.

Pearls have been known to become "sick" and "die" when not worn for a long time. They require the touch of life to keep them brilliant.—Fred Eickhoff, Long Eddy, N. Y.

When spun, a raw egg rotates slowly, while a cooked egg revolves longer and at a much greater speed.—Harry Kirk, Jr., Nyack, N. Y.

If the atomic energy in a single match stick were fully exploded, the force would drive a million 125 h.p. racing cars.—William J. Bell, Grand Forks, N. D.

Explosive shells fired from artillery guns have been used by the Swiss army to "shoot down" snow on slopes where natural avalanches might result. Loud noises or concussions—even the shout of a human voice—will often touch off a layer of loose snow and start an avalanche.

Steel-jacketed bullets must be used in high-powered rifles, otherwise the terrific friction created by the passage of the bullet through the bore would melt the lead pellet.—H. W. Sweeny, East Orange, N. J.

Oysters have no fixed sex. After tiring of the duties of motherhood, a female oyster can become a male. Likewise, after several months of fatherhood, she can return to the female state. The same is true of the male oyster.—Irving Scherlis, Baltimore, Md.

Scientists have found that the brain of an alert man can react to a stimulus in two-fifths of a second. For example, if anything happened to Sir Malcolm's racer at 300 m.p.h., it would travel 176 feet before Campbell's brain could transmit a thought to step on the brakes.

All radium thus far collected would not weigh as much as a golf ball.—William Harris, Nanaimo, B. C.

A fountain pen will spurt ink if opened during an airplane flight at high altitude. Reduced air pressure exists outside of the barrel, while normal air pressure within the ink chamber forces it out.—R. C. Lewis, Riverdale, N. Y.

Dead Sea apples, grown in Arabia, are filled mainly with air and explode when pressed or struck.—M. G. Kupsik. Torrington, Conn.

A snail, traveling steadily day and night in a straight line, would require two weeks to go one mile.—Philip Alexander, North Buxton, Ohio.

Hugh swarms of butterflies cross Panama each August. No one knows where they come from or where they go.—Elmer E. Johnson, Ashland, Wis.

One dollar will be paid on publication for every Paragraph Oddity accepted. State source or proof. Do not include Oddities with contributions or letters for other departments. No items will be returned.

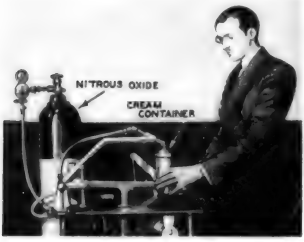
Noted Surgeon Performs Blood Transfusion On Lion

UNDER treatment for a peculiar malady, "Pal," 400-pound two-year-old African lion recently was given a blood transfusion by Dr. W. A. Jaquiss, noted wild animal surgeon of Hollywood, California. The operation, a rarity in wild animal care, was performed successfully after numerous tests were made on the blood of various other lions.

Although Dr. Jaquiss is accustomed to handling almost every type of animal brought under his medical care, he required the services of two able assistants in order to make this particular blood transfusion.

Dr. W. A. Jaquiss, Hollywood's world famous animal surgeon, is shown above treating one of his wards for mysterious ailment. The animal is "Pal," noted lion actor of the movies.

Cream Whipped By Expanding Gas



Charles A. Getz, Illinois chemist, is seen injecting harmless gas in container. When opened, expanding gas aerates cream.

AT THE push of a button, ordinary cream, subjected to a new process, can now be turned into whipping cream. The cream is first put up by the dairy in containers of automobile steel. Rendered air-tight by the elimination of oxygen, the container next receives an injection of nitrous oxide gas. As the housewife presses the button on the top of the small cask, the nitrous oxide expands, forcing out the cream under pressure and, through aeration, whips the product.

Clothes from Sugar Cane Assured

A NEW use for sugar cane refuse in the manufacture of many articles of clothing and paper was developed recently by D. J. Lynch, chemist of the department of agriculture. Alpha cellulose, derived from the sugar cane pulp by a new process, is the chief ingredient in rayon and transparent wrapping paper. Mr. Lynch will continue his experiments in Hawaii.

Giant Bearing Built for Telescope

THE largest anti-friction bearing ever built will become a part of the mounting for the new 82-inch reflecting telescope being constructed for the University of Texas. Having an inside diameter of 43 inches, the bearing will carry the loads developed by the 14-ton instrument.

Such a fine degree of accuracy was demanded that out of the 76 tapered rolls used in the bearing, no two out of the lot differed in size as much as .00025 inches.

Delicate instruments were used to detect "play" so that photographs of long exposure might be made without a blur.

Extreme accuracy was required in the manufacture of this largest of bearings for use in a 14-ton telescope assembly.

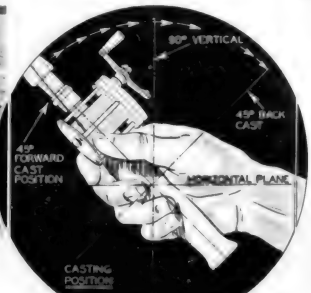
SPORTSMEN'S

How To IMPROVE Your

by ROBERT PAGE LINCOLN
Hunting and Fishing Editor

Accuracy is important in bait casting if you want to be a successful fisherman. Here an expert reveals the fundamentals of this popular sport.

Guiding line between thumb and forefinger of left hand, Robert Page Lincoln, author of this article, keeps line taut as he hauls in a big one by cranking the reel with right hand.



Positions of the hand and reel are important. At start of cast reel handle points upward and at end of cast is turned inward to the left to slow down the momentum of the spool.

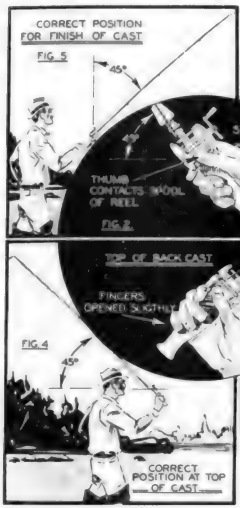
TWO-THIRDS of the bait casting fishermen have a great deal to learn about the art of bait casting. The majority give little thought about the outfit with which they are casting and pay little attention to their method of casting. Their main idea, apparently, is to get the bait out in one way or another, so that it falls on the water somewhere within ten feet of the desired spot.

In addition that most useless of all casts, the side-cast or side "swipe" is the method almost universally used, few apparently casting in the only accurate manner, which is overhead. It is obvious that most side-swipers know little of the art of bait casting from the start. Had they studied some of the rules for casting, they would have been repaid, not only in the sheer joy of casting, but in the number of fish caught.

At the start, therefore, I wish to make it plain that while the side cast or side swipe is not outlawed, it should not be used in regular fishing practice. It is dangerous especially when one is casting in a boat. There is a time and place for the side cast, such as when one wishes to get up under the overhanging bushes and trees along shore, when the overhead cast would ensnarl the lure in the foliage.

In fly casting the rod is the great motive power which forces the line forward to its destination. The fly casting reel, while occupying a more important position than merely holding the line, does not provide impetus to

BAIT CASTING FORM



These drawings illustrate the proper positions of the rod at forward and back casts. Thumb should never leave contact with the spool. It should be ready to control speed of reel.

Landing a northern pike after a successful cast. Game fish must be "played" carefully until they tire from the battle.

the cast. In bait casting the rod is secondary in importance to the reel. It is the latter that is the power that gets the bait forward to where you want it. Therefore a good reel is important to the bait caster.

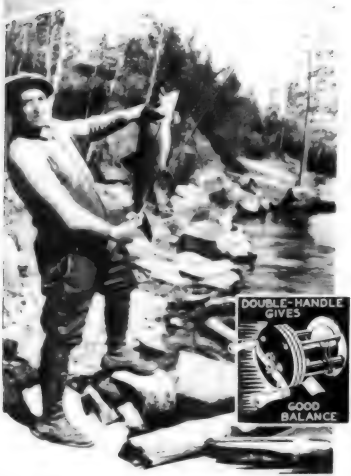
Your reel should have a level winder, not only for practice casting, but for all-around use. The reel should spool fifty yards of line, preferably of the soft braided type, and, for practice casting purposes, should be 12-pound test. After you are proficient at casting, you can later use a heavier line, say an 18-pound test hard braided line.

The line should "fill" the reel not up against the cross-pillars, but to within a fourth inch of them. Your fifty yards of line will not fill the reel to this point, therefore some cheap line is first reeled on, the good line is tied to that, bringing the spooled line up to the given distance from the pillars. The larger the core or spooled line the easier it goes out, and the easier it is for the thumb to regulate the spool.

The proper bait casting rod to use depends largely upon one's preference. The bamboo rods are popular, but even more so are the solid steel rods and the new seamless tubular steel rods. If getting the solid steel it should certainly be of the highest quality to be had.

Regardless whether the rod is bamboo or some type of steel rod, it should be no less than five feet in length, the five and one-half foot length being standard. Anything shorter than this is too stiff in any material, and any-

Use INNER TUBES as CASTING TARGETS



Robert Page Lincoln displays a fine lake trout caught by bait casting. The double-handle reel is recommended because it improves balance and does not vibrate and sway.

thing longer is likely to be too limber and whippy.

Most of the solid steel rods, also the seamless tubular rod of the new type are provided with built-in finger-pulls under the reel-seat, over which to hook the forefinger when casting. There is little doubt but that the finger-pull is a distinct help in casting since it permits a better grip on the rod. The offset handle, which drops the reel lower in line with the rod, also is a distinct value because it does away with the need of the thumb reaching up for the reel.

If possible, do your practice casting on the water. The end of the dock is a good place. You need targets to aim at and these can be simply made by taking inner tubes and blowing them up, anchoring them at 40, 50 and 60 feet distance away from you. Within these distances will be found over two-thirds of the fish that you will catch. Don't try for distance at all in starting out. Try for accuracy and let distance wait.

There are hookless casting weights, used in practice casting, weighing around five-eighths of an ounce that are recommended. The hooks removed from a floating surface bait will prove a good substitute. When ready to cast, have the lure hanging about four inches from the tip of the rod and extend the rod in front of you, aiming at the target. Throw the rod back over your right shoulder and without noticeably stopping cast forward. As the forward cast goes into effect and as the lure shows signs of dropping in the arc that it describes, release the thumb from the revolving spool just sufficiently to permit it to turn without hindrance. But understand this: The thumb should never quite leave contact with the spool. The line should at least lightly brush against it.

As the bait travels on its way, gradually dropping to the water, the spool loses its momentum. This is the signal to the thumb brushing the spool to gradually press forward, increasing the pressure so that when the bait nears the water the thumb goes down firm and determined on the spool, stopping it entirely. This pressure of the thumb on the spool must be very gradual. If the thumb is applied suddenly there will be an over-run-

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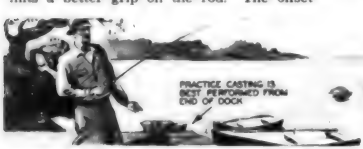
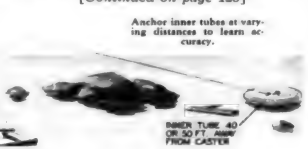
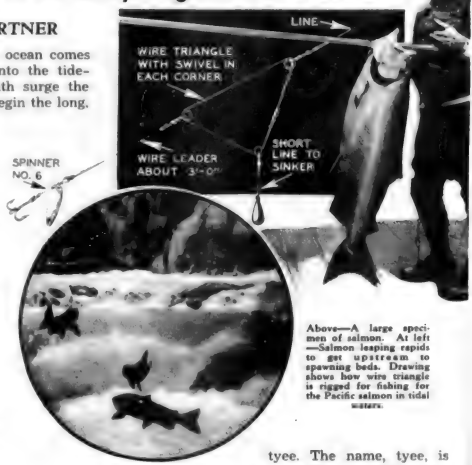




Angling for CHINOOK, Mightiest SALMON

by PAUL W. GARTNER

OUT OF the pounding ocean comes the silver horde. Into the tidewater of the river's mouth surge the valiant salmon, eager to begin the long, bruising journey from which there is no return. Never feeding after they have left the salt water, the finned crusaders battle the swift currents for weeks, and often months, until they arrive at the feeding streams which are their spawning grounds. Leaping over obstacles that bar their way, fighting off other salmon who would take their mates — only complete destruction will prevent them from maintaining their race. In the shallow tributaries the Pacific salmon spawn and die, and their carcasses help to furnish subsistence for their millions of progeny.



Above—A large specimen of salmon. At left—Salmon leaping rapids to get upstream to spawning beds. Drawing shows how wire triangle is rigged for fishing for the Pacific salmon in tidal waters.

Along the greater rivers of our northwest coast anglers eagerly await this silver tide. There are five species of Pacific salmon—the humpback, the dog salmon, the silver, the chinook, and the blueback or sockeye. But only two, the chinook and the silver, also called the coho, are known to take artificial lures readily both in salt and fresh water. Four years is the life cycle of all Pacific salmon, save the humpback, which is two years. After spawning once they all die. Important rivers of northwestern America which enjoy vast runs of salmon are the Sacramento, Eel, Klamath, Smith, Umpqua, Rogue, Willamette, Columbia, Fraser, Campbell, and Yukon. The waters of Puget Sound, also, are world famous for salmon fishing.

Mightiest salmon in all the world is the chinook, also identified as the king salmon, spring salmon, quinnat, Columbia River salmon, Sacramento salmon, tschawytsche, and tyee. The name, tyee, is generally applied to a chinook over 40 pounds in weight. Sometimes in its short life of four years it attains a size of more than 100 pounds.

Most sport fishing for salmon is done by trolling in tidewater channels or in bays or straits. The accepted lures are spinners, from size Number 5 to 9, or spoonhooks from 3 to 8 inches in length. These may have surfaces of brass or bronze, and chromium or nickel. But in the tidewaters the lures must be fished deep, so that often a sinker of from one to 4 ounces is attached just above the 3-foot steel-strand leader by means of a wire triangle.

Everything from light bait casting rods to deep sea tackle is used for salmon fishing, but it is not wise to subject a steel rod to the erosive effects of salt water. Ideal tackle for the greater chinook is a split-bamboo rod, with a 6-foot tip weighing from six to eight ounces, and a sturdy reel spooling from 150

[*Continued on page* 130]

Device Grabs Car; Protects Safety Zone

Above photo shows police examining the new "death-proof" safety marker. Circle—How hooks halt car after impact

A "DEATH-PROOF" safety zone marker, claimed by police officials to safeguard the lives of pedestrians and motorists, was given its initial test recently at Cleveland, Ohio. Invented by Jerry Murphy, superintendent of the Cleveland police signal system, the mushroom-like device consists of a ten-foot spring mounted in a hollow post which stands seven feet above the ground. A four-prong grappling hook with down-pointed fingers is fastened atop the post.

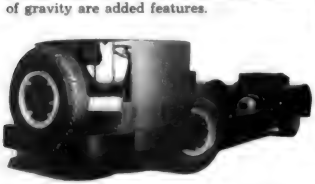
When hit by a car, the stanchion bends over until it is parallel to the street surface. As the auto passes over the post, one of the metal fingers grasps an axle or bumper and brings the vehicle to a complete stop.

Following an accident, two men can replace the hollow pole in twenty minutes at a cost of $26. The upkeep of similar signs in other cities is considerably larger.

Bus Wheels Have Separate Drives

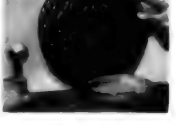
GREATER safety and speed along with lower operating and maintenance costs are features claimed for a new type traction system for buses in which every wheel is independently driven by an electric motor. Multiple-drive motor wheels are said to provide smoothness in acceleration and deceleration since jars and jerks from clutches and gear-shifting are absent.

Uneven power impulses from the engine to the wheels are eliminated since electric transmission is claimed to cushion sudden changes in throttle positions and absorb all shocks of tire traction. Low floor levels and low center of gravity are added features.



Chassis of car (above) is seen equipped with multiple-drive wheels which, while synchronized, operate independently.

Seal City Noises In Cornerstone



Above—Tiny portable device used for recording street noises for posterity. Left—Treated phonograph disc ready for cornerstone - sealing. Cadmium-plated pick-up and chromium-plated needles were sealed with records.

MUMMIFIED phonograph recordings of twentieth century noises recently were sealed in the cornerstone of a New York building to enlighten future generations of present-day tempo. All sounds were captured on location, super-imposed on three chromium-plated master discs, coated with a tar-like preservative and deposited along with needles and a pick-up device in a copper box. Method of removing tar was etched on glass.

Women and Smokers Have Steadier Nerves, Device Proves

WOMEN are better than men when it comes to a steady hand and certainty of aim, according to Dr. H. H. Seashore, University of Southern California psychologist. More startling, perhaps, is the discovery that tobacco-users are steadier than non-users. To carry out his experiments, the doctor employs an unique device. A pistol handle is grasped by the subject so that rays from a tiny mirror are deflected through a grid into a photo-electric cell which automatically records hand tremors.

Kathleen Burke, film actress, is seen trying the nerve-tester. Pistol vibrations reflect beam from mirror to electric eye.

Flashlight Generates Own Power

Small and flat, this current-generating flashlight casts a strong beam and is not affected by cold or heat. A magneto is built in.

A BATTERY-LESS, vest-pocket flashlight, which generates its own electricity by hand-manipulation of a lever controlling a built-in magneto, has been invented in England.

Proposes Straightening Thames

APPROXIMATELY one square mile of the world's most valuable land would become a part of London, if the gigantic proposal of a British engineer to straighten the snake-like River Thames is carried out. The plans suggest using the reclaimed land for a two-level highway, public parks and underground bomb- and gas-proof shelters.

Drive Movie Bus from Crow's Nest

UNIQUE in design is the multiple-wheeler shown below, which was designed for a film now being made at the Paramount studios. The 36-passenger vehicle is operated by a driver who sits in a glass-enclosed crow's nest jutting out from the 15-foot roof. The road liner has an oddly-shaped tail fin which extends high over the rear observation platform. The bus has four rear wheels and a circular vent in front in order to cool the radiator.

Left above—Paramount's studio bus is rounded and grilled like a stream-lined train. Right—Note tailpiece at rear.

Radio-Controlled Lightship Will Guide Great Lakes Boats

Photo above shows David N. Reid, radio constructor of the Lighthouse Service, examining apparatus for lightship control.

THE only lightship of its kind in the world, operated remotely by radio control, will take its station this summer on Lake St. Clair in eastern Michigan. Anchored eight miles into the lake, the ship will be operated by a shore crew which will work the air fog signal and radio beacon. The electric light will be regulated by an automatic astronomical clock. In addition, the boat will have an auxiliary gas light, operated by a photocell so that sunlight will extinguish the lamp while darkness will turn it on.

The lightship will give an automatic signal the last fifteen minutes of each hour. During foggy weather shore crew will start fog signal by radio.

Boys Build Model of Boulder Dam

A MINIATURE model of Boulder Dam, one thousand times smaller than the actual structure, has just been completed by three Los Angeles high school students. Requiring two and one-half years to build, the model was made to scale out of cork linoleum, plaster of Paris, wood and copper wire. More than 40 features are labeled. The replica shows a large variety of tiny constructional machinery in use at the site.

Marking Device Fits Can Spout

A NEW device for marking out lawn tennis courts, baseball diamonds and other sports fields has just been patented by a London inventor and soon will be placed on the market. The novel marker, which will fit an ordinary garden water sprinkler, consists of a roller attached to the spout.

Inexpensive attachment converts watering can into field marker.

Left above—William K. Sherinyan (at left), instructor of engineering drawing, supervised his three student builders in the construction of the unique Boulder Dam replica. Right—Closeup of model, made during school hours, shows careful attention paid to minor details. Linoleum was employed to establish proper contours of the terrain at the Black Canyon site.

Student Designers Style FUTURE CARS

To discover hidden talent, scores of car factory employees are given free engineering and design courses at the manufacturer's expense. Typical classroom of this type of student is seen at right.

Above—Ray Dietrich (right), eminent auto body designer, shows student how car styling grows out of pencil sketch.

Above—Full scale wood model, when completed by designer, is "sliced" into separate pieces for the tool and die-makers.

TEN thousand dollars for a pencil sketch of a proposed motorcar!

Even this huge sum has not been considered unreasonable by automobile manufacturers who spend many millions for styling. Because most colleges and universities are ill-equipped to fit men for modern engineering and designing requirements, industry has established its own schools. Some of these are duly chartered, award master degrees and rank high among institutions of learning.

The designing school of the Chrysler Institute of Engineering was founded to bridge the gap between theory and practice and insure the industry of an unfailing supply of trained and competent men. Headed by Ray Dietrich, whose rise from laborer to world famous auto designer has been phenomenal, the institution offers a complete three-year course for the development of latent talent.

Men who show an aptitude for specialization and are willing to study are picked from the assembly lines, metal shops and foundries for extra classwork. For every year in the Institute, the average student is said to increase his earning capacity by $100 a month.

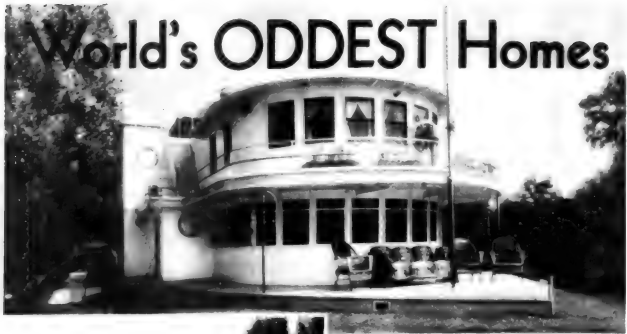
Because the present demand for car designers is great, magnates are willing to furnish this training at their own expense. They realize that, as in Dietrich's case, the laborer of today may be the outstanding stylist of tomorrow.

Dietrich's climb is typical of the reward which similarly awaits today's youths who show persistence and natural ability. As a child, Dietrich sketched. At 12, he labored in a factory to earn drawing materials.

It was an uphill drag all the way for the ambitious lad. At a New York custom body building factory, he decided to become a designer. He studied engineering and started business on his own. Four years later, he went to Detroit where his rise to fame and wealth was rapid. Widely sought by competitors, he began collecting retainer fees that would make a movie star envious. Despite the depression, Dietrich's place in the auto industry is as secure as ever.

Unlike the early designers, modern-day artists now draw their sketch from which they construct a small model of clay or wood and then make accurate, full-scale projections.

World's ODDEST Homes



Designed in the manner of a pleasure boat is this unique $12,000 home built by Charles Baisley at Wyandotte, Michigan. Two promenade decks encircle front of house.

Palatial drawing room of Baisley home is like ship's salon.

On top of Baisley's ship home is this hurricane deck, where he can enjoy cool summer breezes, watch lake traffic.

Upside down is this old ship, now the home and roadside store of a California fisherman. 'Tis a house without a roof!

SCATTERED in out-of-the-way corners of this country are a number of architectural oddities that bring nightmares to conservative, staid architects, astonishment to the world at large, and to their builders the satisfaction of knowing that they are living in homes built around their hobbies or favorite vocations.

In Wyandotte, Michigan lives Charles E. Baisley. Retiring after half a century of shipbuilding, he built a home overlooking the Detroit river—a home where he could while away leisure hours, watch the ore freighters, the grain ships, the myriad other vessels that he had built, pass in review before him.

Baisley's last ship-building job is his home. In the manner of those who welcome the rolling sea, he built a promenade deck, a lounge with palatial salon, a hurricane deck, a galley down the companionway, and even a boiler room.

Thousands of miles away, in sunny California a fisherman turned over an old hulk of a boat, moved it alongside a busy highway, and divided it into rooms for his home and a roadside stand at which he sells fish, crabs and lobsters.

ASTONISH ARCHITECTS

Out in the Badlands, on the Buddy ranch, is this observation car home, completely covered with rainbow-hued petrified wood. Wheels are buried.

The Kiosk Sphinx, another claimant to title of "world's oddest house", defies all architectural standards. It is the new $350,000 home of Washington Porter II in Chicago. Atop the 60-foot pylon at the left is a 60-foot high Egyptian obelisk.

For another of the world's oddest houses we move to the Badlands, near Medora, North Dakota. The home on the Buddy ranch is nothing else but an observation car, moved from the railroad through the hills on skids to its present site. The outside walls are covered completely with pieces of petrified wood. Running water piped in from a spring up in the hills, electric lights, and telephone give all the conveniences of a modern city home.

And now to Chicago, where the Kiosk Sphinx, $350,000 home of Washington Porter II, raises its many minarets, pinnacles and obelisks into the heavens. Like a combination of modern geometrical figures with ancient Egyptian architecture is this four-story edifice of steel and masonry.

Before the house is a sunken garden with massive 60-foot pylon, on which stands a 60-foot obelisk. Inside are antique art treasures gathered from palaces in Europe, Egypt, and the Orient. Glass tiles form a part of every floor; light flooding into every room from above combines with that entering through the many vari-colored windows to illuminate the exhibits from every side. At night electric lighting on only one floor illuminates the entire building. Periscopic mirrors set into the walls permit attendants on any floor to see into almost every room in the house.

Revolving HOUSE Follows Sun's Course

The radically designed house shown above, built on an Italian hillside, is rotated slowly on a circular track so that its living-rooms always face directly into the sun at all hours of the day.

"KEEP your face always towards the sun and the shadows will fall behind you." At last this old slogan has gone domestic. An Italian house-builder, with an eye toward the unusual, has constructed a home so bizarre that every living room can be converted into a sun room at the owner's command. Circular in shape, the house follows the sun like a mechanical sunflower.

The living rooms, revolving on circular tracks, make the complete turn within the arc of a circle in nine hours and fifty minutes. The motive power is furnished by a three horse-power engine which operates in the center of the house and turns the rooms with the same relative speed as the sun.

Artists Urge Healing By Color

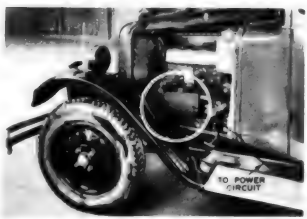
THE use of pastel panels for mental healing has been suggested by artists in the treatment of the sick. A group of New York artists plan to ask for $15,000 of government funds to exhibit the panels.

Midget Rocket Pistol Fits Hand

A NEW type of rocket pistol, which weighs only four pounds and is capable of throwing a line a distance of at least 100 yards, was given its initial test recently at Liverpool, England. The pistol is grasped in the right hand while the line is fed out of a metal container held in the left hand.

An engineer of the Hoylake Lifeboat, Liverpool, is seen below operating the naval "pocket-size" rocket pistol which is designed for life-saving to a distance of 300 feet.

Electric Pad Heats Cold Motors



Heating pad for motors in winter connects with power circuit.

TO ELIMINATE cold-motor starting in frigid weather, German engineers have developed a portable heating pad which may be applied to the engine at night, assuring a quick getaway in the morning. The motor is always warm and available for immediate use.

Dizzy Apple Cuttings Take Root

AFTER whirling in a centrifuge at a speed of sixty revolutions per second, cuttings from apple trees and other plants have been found to take root and grow more readily, according to experiments recently announced by a well-known Russian horticulturist and plant breeder. Exposure to many times the earthly force of gravity, resembling the gravity which they might experience on a larger planet, accounts for the increased activity. In the past, fruit growers have had difficulty in making cuttings take root by themselves without grafting.

Mechanical Robot Supplants Hand Method of Sorting Peas

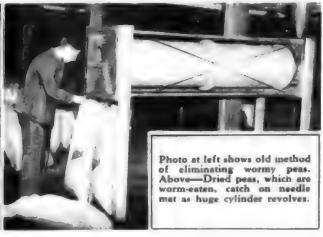


Photo at left shows old method of eliminating wormy peas. Above—Dried peas, which are worm-eaten, catch on needle mat as huge cylinder revolves.

Iceland to Tap Geysers for Heat

NATURE will stoke the furnaces of Reykjavik, capital of Iceland, in the future if plans to tap the nearby volcanic hot springs materialize. Although Italy already has harnessed its interior fires for the benefit of industry and the home, the Icelandic experiment is unusually novel because of the extreme cold which prevails in this northern climate. Water will be piped from the world's hottest geyser.

Model Plane Takes Air Pictures

A new picture-snapping model airplane, held by its inventor, J. M. Schutte (above), is readily built from construction kit.

A STURDY model plane, which carries a small camera for making its own aerial photographs, has just been devised. Situated in the nose of the craft, the camera has a shutter trip which can be controlled by the operator in such a manner that pictures can be taken from any altitude and at any instant. Immediately after snapping a picture, the plane glides gracefully to the ground for resetting of the camera. The model is capable of ascending to over 1,000 feet in the air.

THE newest mechanical robot, which can sort dried peas more infallibly than the best human inspector, has just been invented by a London consulting engineer.

Heretofore, peas which were worm-eaten had to be separated out under a strong light. The process was eye-tiring and monotonous. It was far from satisfactory.

The new pea-sorter eliminates these difficulties. The peas to be inspected pass through a long revolving cylinder, the inside of which is studded with thousands of needle points. If there is a worm hole in a pea, this hole is sure to catch sooner or later on one of the needle points. Such peas are discarded automatically, while the perfect ones are not held up by the needles but roll through the whole cylinder and may be used for food.

"Candid Mike" Is Match-Box Size

TO KEEP sports broadcasters, after-dinner speakers and others at the proper distance from the microphone, a tiny "velocity mike" which can be carried on a ribbon like a monocle, has been devised. Scarcely larger than a match box, the case which conceals the transformer weighs only eight ounces. The frequency response ranges from 60 to 7,500 cycles. A microphone cable up to 2,000 feet in length can be used where the device is carried about.

This midget velocity microphone can be used where a microphone should not be seen. Acoustic feedback is practically eliminated.

Unique Hand-Propelled Aquaplane Has Speed of 14 m.p.h.

S. Shapiro (left), inventor, is shown above strapping a model of his propellor-driven aquaplane to a fair bather.

SHAPED like a Buck Rogers' rocket-ship, a self-propelled aquaplane has just been devised by a Santa Monica, California inventor. When strapped to the swimmer and cranked by both hands, a speed of fourteen miles an hour can be obtained. The full-size aquaplane is five feet high and five feet wide. Bronze buoyancy tanks are ten inches in diameter and will support 180 pounds.

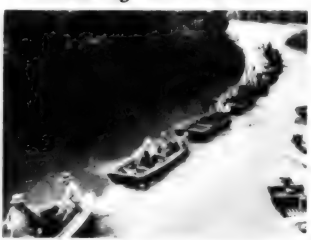
Straps passing around the body and over the shoulders of the swimmer hold the odd device firmly in position. The hand crank turns a small propellor in the stern. Life guard stations along the southern California beaches are expected to add the aquaplane to their rescue work equipment.

Hopes To Grow "Cheap" Orchids

ORCHIDS will be as cheap as sweet peas for corsages if present experiments by a botany professor at Northwestern university are successful. In a flask containing a solution of mineral salts, sugar and agar, she already has succeeded in germinating seeds of Grass Pink orchids. After six months in the flask, the plants are transplanted into the greenhouse. The Grass Pink species is related to tropical orchids.

Professor Margery C. Carlson, experimenting with "test-tube" orchids, is trying to produce reasonably low-cost plants.

Boat-Towing Found Profitable



Youth provides boat livery and service for fishermen.

TOWING service for anglers, a profitable enterprise which offers excellent possibilities for motor boat owners, has been highly successful on the Sacramento river, according to Ike Button who operates a motor camp. For a nominal fee he tows as many as 20 boats and their occupants to the best fishing grounds in the river, returning at night to pick up the various parties. Because Button keeps informed on fish movements, anglers appreciate his towing service both as a time and labor saver.

Tapping Brain Decreases Deafness

BY DRAWING off the cerebro-spinal fluid in which the human brain is bathed and replacing this with air, a noted New York ear specialist has discovered that middle-aged deafness and nervousness can be partially corrected.

Three Room Tower Unit to Cut Home Cost

Diagrams show architect's conception of a typical central core house. Cross-section at extreme right reveals three main units which are suggested for standardizing.

IF AUTOMOBILES with identical power plants can have different kinds of bodies, why can't inexpensive houses be built around one main core or tower?

So reasoned three London architects whose startlingly new housing plan introduces a new era in home-building and threatens to revolutionize construction work in general. The trio proposed that only the central core of the house be standardized. Living rooms, bedrooms and the remainder of the house might then be constructed at low cost around this core in whichever manner the owner desires.

The most expensive parts of an ordinary small house are the kitchen, bathroom and furnace room, which contain almost all of the plumbing, gas piping and mechanical equipment. Since these three units usually are placed one atop the other—the furnace room in the basement, the kitchen on the first floor and the bathroom on the second floor—the architects have suggested that this three-story unit be manufactured in quantity and used as the principal core for small houses. In this way, all pipes, fittings, electrical connections, chimney outlets, etc., would be precisely the same.

Local workmen would be required merely to install sewer connections and proper water and electric mains and assemble the central tower. The arrangement and size of the wings or extra quarters would depend of course on the owner's wishes and available funds.

By eliminating the necessity of fitting the plumbing and other facilities to different shapes and sizes of houses, the cost of home construction would be reduced greatly, the designers pointed out.

The INSIDE STORY

Circle—The carefully selected leather is cut with keen-edged knives around metal patterns. Upper right—Seaming the "uppers" of the shoe

Above—An ordinary thing, your shoe? Here are the many parts which go into their making.

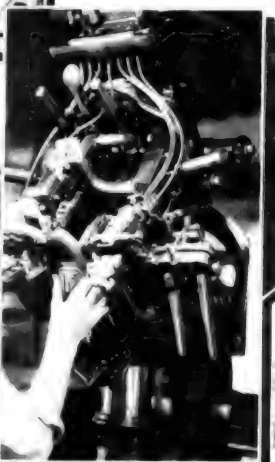


Photo above shows welt sewed carefully in its place. The welt allows attaching of the heavy sole to the shoe-uppers. Below—Coating ground cork insulation on soles to stop squeaks.

Stitcher, shown above, fastens the thick sole of the shoe to the welt.

Above—The shoe is fashioned into shape by an ingenious machine which grasps the form securely and stretches the leather around the last. Such lasts are perfectly sculptured models of human feet. Right above—Affixing heel to the under part of the shoe sole with nails driven upward.

of the SHOES YOU WEAR

After the finishing touches are put on the shoe, a worker wraps and packs each pair in the box with which the consumer is familiar. Circle—Only choice skins are used in shoe-manufacture. A month of treating is needed to prepare hides.

A size 34 shoe, believed to be the largest piece of footwear ever made and actually worn, is shown alongside of a midget size 2. Both are complete in every detail and required special lasts in the construction of each of them.

by **HAROLD L. ZIMMER**

Those shoes on your feet—take a good look at them. Over 200 chemicals were used in tanning and preparing the leather. Approximately 125 separate operations were performed in their manufacture before the shoe clerk finally asked, "What size do you wear?"

Let us go through an up-to-date shoe factory and see how modern science and invention turns out comfortable, non-pinching footwear at low cost.

In the sorting room, leather of every description, texture and color is stored. Surprising as it may seem, the curing and tanning of the hide is practically half of the business of making shoes. From 31 to 37 days of continuous treatment are required to turn out the skin in its finished form.

The skin then goes to the cutting room where men, using small, sharp knives and metal patterns, carve out the various pieces. The cutting is done on a square "block-board" which is treated with oil to keep it smooth.

The pieces, consisting of a vamp, two quarters, a tip, two lace-stays, top-facing, tongue, back-stay and heel pads, are sent next to the assembly room. Here are row upon row of sewing machines used for each individual operation.

The girl who is working on our particular pattern stitches the machine-cut linings to the leather pieces. Then the two quarters are sewed together. Along the seam between the two quarters, the back-stay is laid and stitched in place to strengthen the back, or counter.

Later, the two quarters are brought together at their open end and attached when the tongue is sewed in place. The vamp wraps around the shoe over the tongue and quarters. When the tip is stitched on the end of the vamp, the shoe-upper is completed.

It doesn't look like a shoe yet. It is a flabby, shapeless circle of stitched leather. It must

[*Continued on page* 118]

Motorist Dons Skis to Drive "Snow-Cycle" On Endless Belt

Dr. Riemerschmid, Munich inventor, built the cycle above.

ODD in design, a new motorcycle has been invented in Germany which will carry the winter traveler over snow-covered areas with the same ease he enjoys during summertime.

The vehicle moves forward over the snow trails by an endless belt arrangement which passes around both wheels. The speed is determined by the movement of the belt which has considerable width to give the necessary traction.

In place of the usual foot rests found on ordinary motorcycles, the driver wears skis on both feet to help him to retain his balance.

A metal hood extends over most of the front, while "ears" protrude to protect the driver's hands.

German Cars Run With Coal Gas

MOTORCARS operated by the Berlin Gas company now use coal gas for fuel. Bottles containing the gas nest in a false bottom beneath the surface of the truck box and, when empty, may be refilled within five to seven minutes. To encourage the use of wood and other substitutes for gasoline, Germany offers to cut taxes on vehicles so operated.

Coal gas is employed to operate a fleet of German motorcars. Use of the new fuel is said to reduce costs of operation.

Unique Pipe Draws Smoke Upward

The short length of U-tubing seen in the new pipe above is claimed by its maker to halt all moisture in stem and bowl.

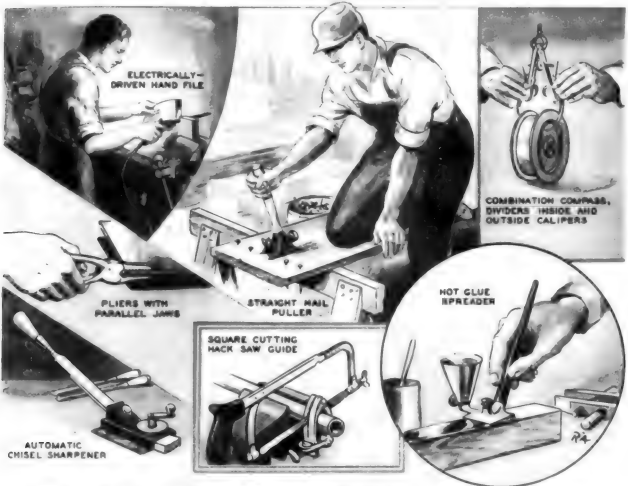
A PIPE which draws its smoke upward, holds all moisture in the bowl and thus eliminates sluggishness is the latest accessory for the smoker's kit. Smoke travels through tubing mounted atop the pipe stem. The stem itself is solid between the U-tubing. Less pipe cleaning and cooler smokes are said to result.

Pen Holds Handy Roll of Stamps

A NOVEL fountain pen which holds a coil of postage stamps, thereby eliminating the necessity of searching for stamps after a letter is written, was exhibited recently at the British Industries Fair. When not in use, the stamps roll back into the barrel of the pen and are out of the way for writing.

Above—Combination pen and stamp-vendor is novelty for writers.

FAME and FORTUNE Await INVENTORS of NEW Improvements in WORKSHOP Tools



Thousands of dollars in royalties await mechanically-minded persons who can produce workshop devices similar to those illustrated in the above drawing. For further advice on safeguarding your ideas, consult the Patent Editor, 529 South 7th St., Minneapolis, Minn. Enclose a stamped reply envelope.

MOST of the improvements made in hand and machine tools come through men who use such things everyday. Because readers of MODERN MECHANIX AND INVENTIONS are found in this group, perhaps a list of needed tool and machine inventions might be particularly useful and inspire improvements that would bring their inventors tidy sums of money.

Some sort of adaptation or improvement is needed in connection with a claw hammer so that nails may be pulled straight out. This would salvage many nails which are now discarded. Such an invention would be worth $50,000.

A combination instrument which might be used as a compass, dividers and inside and outside calipers would be a big money maker and could be sold for at least $30,000.

Similarly, any mechanic who can make a practical hand drill with a variable speed will win himself a fortune.

An electrically-driven hand file that could be used in speeding bench filing operations would be bought by every large manufacturer in the United States.

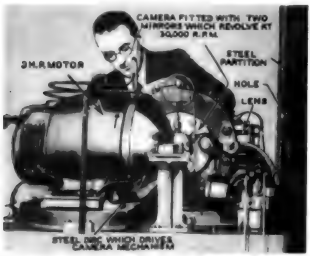
A cheap metal frame attachment for an ordinary hand hack saw, built on the principle of the mitre box for square sawing, would bring a comfortable fortune if the device could be manufactured for less than a quarter.

An automatic saw setter and filer, which would reduce operating time and be of use to the inexperienced, could be sold for $60,000.

An inexpensive metal cap, slipped over the

[*Continued on page* 142]

World's Fastest Camera Captures Action Pictures Of Flames



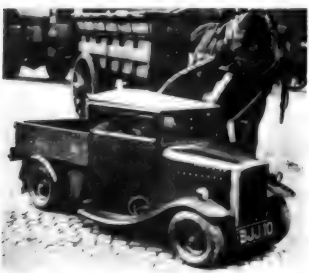
Two rotating mirrors, revolving at a speed of 30,000 r.p.m. and casting off 60,000 images per minute, reflect actual subject on film. R. F. Fraser, inventor of camera, is seen above.

A NEW wonder-camera, equipped with a shutter speed of 1/4000 of a second and capable of recording action pictures of explosions and rapidly traveling flames, was recently demonstrated before 100 scientists at the Imperial Club of Science at Kensington. Claimed to be the fastest camera in the world, the finished apparatus marks the end of a decade of experimentation by R. F. Fraser, young English scientist. Flames traveling at 24,000 miles per hour can be caught with this novel device.

Midget Truck Has One H.P. Motor

THE smallest motor truck in the world, capable of running 70 miles on a gallon of gas, has just made its appearance in London. Equipped with a one h.p. engine, it is claimed to be ideal for small deliveries because of its ease of operation. The motor is started by a pull-out handle at the rear before the driver takes his seat. Depression on a single pedal releases the set brake, opens the throttle, engages the clutch and moves the vehicle forward until a maximum speed of 15 m.p.h. is attained.

When stored in a garage, the midget lorry requires little space. Weighing approximately 300 pounds, the car can be set on end by the driver after the day's work is done.



J. W. Shillan, London inventor, devised the truck seen above. Compare its size with that of the inquisitive horse.

New Paint Moisture-Proofs Floor

A new development in moisture-proofing cement floors in homes, stores and churches adds to attractiveness of basement.

A PRACTICAL method of moisture-proofing concrete floors to make the basement rooms more homelike has been developed. A seal coat is first applied with a stiff scrubbing brush to prevent blistering due to moisture penetration from below. Twenty-four hours later a finishing coat is brushed on. Because of its extreme toughness, the final covering resists scuffing and abrasion to a marked degree. The finishing coat comes in eight attractive colors which permits harmonizing the floor with wall and furniture color schemes.

Gas Blamed For Booming In Lake

THE mystery of the cannon-like booms, which for many years have puzzled the residents near Seneca lake in New York, has at last been solved by geologists. Huge bubbles of natural gas, rising up under pressure from gas-bearing strata beneath the lake, were found to have caused the ghost-like explosions upon reaching the surface. Similar phenomena occur in India and Holland.

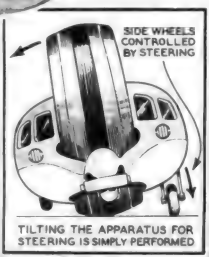
DYNO-WHEEL Drives New MOTOR BUS

Rolling along on a single huge wheel, this motor bus combines safety with high speed.

by VICTOR J. PESEK

PROMISING to revolutionize the field of motor transportation, the new Dyno-Wheel bus operates upon practically the same principle as the tiny "Dynasphere" auto which was successfully built by Dr. J. A. Purves of Taunton, England, some years ago.

A single huge drum wheel supports the car at high speeds. Control wheels on either side are raised or lowered in response to the steering gear, to tip the bus slightly and change the direction of travel. Small fore and aft wheels come into action only when stopping or starting. A stabilizing fin keeps the car level at high speeds.



TILTING THE APPARATUS FOR STEERING IS SIMPLY PERFORMED

FUNCTION OF FORE AND AFT AUXILIARY, OR BASE WHEELS EXPLAINED ABOVE

Ice-Chipper Furnishes Artificial Snow When Nature Fails

Above—Novel snow-maker prepares nearly 50 tons per hour. Upper right—Swept into mounds by a rotary broom, the snow is shoveled on trucks for delivery to ski-jump. Right—Closeup of cutter shows eight sets of keen blades.

LACK of snow no longer will prevent ski-jumping contests. Neither will it be necessary to import snow at great expense by train or truck on the day of the meet.

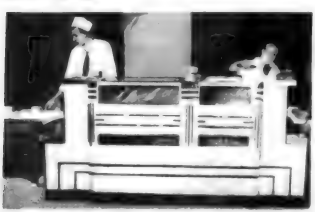
A mechanical chipper, devised by the Toronto Ski club, cuts ice at so rapid a pace that the snow shavings can be easily and economically obtained in huge tonnages from artificial ice in summer, natural ice in winter. The unique machine is equipped with eight sets of sharp blades which are spread over 56 inches of surface. Powered by a gasoline motor, the chipper travels at six miles per hour and can produce 150 tons of artificial snow in 3½ hours. The blades, spinning at 2,000 r.p.m., can be regulated to cut ice from a depth of $\frac{1}{32}$ to 1½ inches.

The artificial snow spreads quickly, melts slowly and is claimed by expert skiers to be much faster than natural snow for running and jumping.

Grease Gun Has Varied Pressure

FAULTY lubrication is eliminated with a newly-devised grease gun head control valve. Easily fitted to all types of pressure systems, the gun head has a hand pump which can boost the line-pressure from 50 pounds to more than 20,000 pounds.

Pressure-controlled lubricator reduces grease bills 65 per cent.



Walter Scharsch (left) spent four years perfecting robot. Windows in 8' 2-ft. oven permit watching progress of meal.

"Robot Chef" Cooks Speedy Meal

A CONTINUOUS multiple cooker which, after nine minutes of operation, is capable of turning out a meal every thirty seconds, has just been invented by a Portland, Oregon, chef. Raw meat, inserted in one end of the electrically-heated machine, passes through hot vegetable oils and emerges from the other end deliciously cooked. Vegetables, biscuits, muffins and gingerbread are a few of the edibles which may be prepared. Completely insulated, the "robot chef" operates with a minimum of electricity.

Transformer-less Power Pack Uses Low-cost BH Rectifier Tube

THIS universal power pack, delivering around 90 volts with a current output of over 100 milliamperes, can be built for little more than the cost of the tube, since no transformer is used. The unit will work on either 110 volts or 220 volts a. c., delivering 180 volts with the higher line voltage.

The rectifier tube used is of the BH gaseous type, recently placed on the market at less than one dollar. The tube is connected half-wave, socket prongs being connected together as shown in the sketches.

The .1 mfd. condenser reduces line noise, while the .002 mfd. mica condenser effectively eliminates tunable hum. A standard filter network is employed.

Be sure to make your receiver ground connection through a .1 mfd. fixed condenser, to prevent the possibility of directly grounding the power line and blowing tubes and fuses. An ordinary audio transformer with primary and secondary connected in series may be used in place of the choke coil.

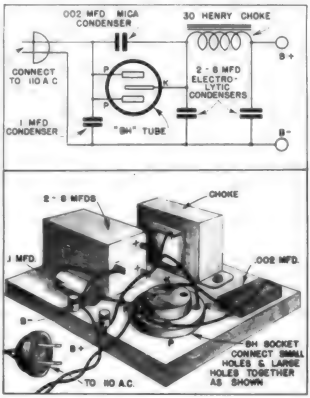
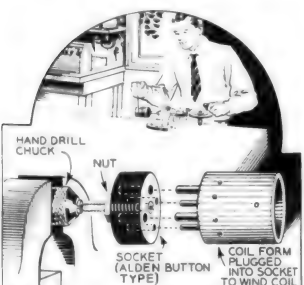


Diagram and sketch show inexpensive power pack assembly.



This simple gadget speeds winding of plug-in coils. Turn drill with left hand, guide wire with right hand as shown.

Hand Drill Winds Plug-In Coils

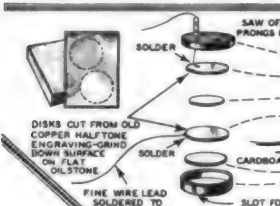
WHEN winding a number of short wave plug-in coils, and especially coils for the broadcast band, a geared hand drill will save time and give a perfectly uniform winding.

Get a solid bakelite tube socket of the type which has a hole through the center, the number of prongs corresponding to the number of prongs on your coil forms. Put a long machine screw through the hole, and lock in place with a nut, as shown in the sketches. This socket can now be placed in the chuck of a hand drill mounted in a vise, and the coil form plugged in. If the wire is held about ten inches from the coil, a uniform winding can be obtained with ease.

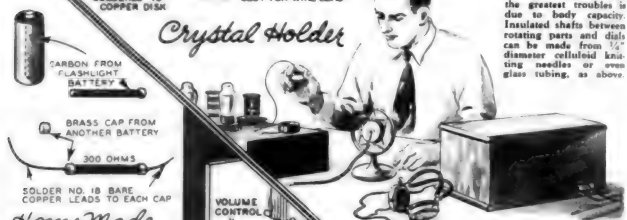
Radio Kinks

Extension Shaft for Condenser

In ultra-high frequency radio work or even in short wave sets one of the greatest troubles is due to body capacity. Insulated shafts between rotating parts and dials can be made from ¼" diameter celluloid knitting needles or even glass tubing, as above.



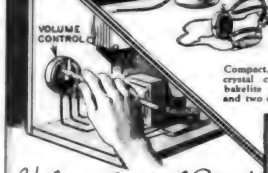
Crystal Holder



Compact, inexpensive holder for transmitting crystal can be made from section of old bakelite tube socket, section of tube base, and two copper discs that are ground smooth.

Home-Made Resistors

Carbon cores of flashlight cells make inexpensive radio resistors. Force extra metal cap over bottom end of carbon, then solder soft copper leads to each cap. Standard flashlight core is about 300 ohms; shorten rod to get lower values; reduce thickness of resistor to increase resistance.

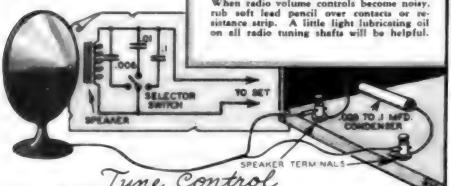


Volume Control Repair

When radio volume controls become noisy, rub soft lead pencil over contacts or resistance strip. A little light lubricating oil on all radio tuning shafts will be helpful.

Plug-in Coil Handles

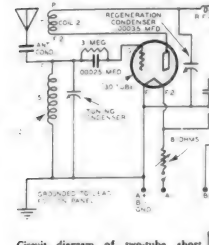
Home-made plug-in coils are more attractive, more convenient, if celluloid card chips are cemented over top of form as shown above. Roughen lip of tube base with file, to insure good surface for cement. Neatly letter wave band of coil on top, with ink or knife.



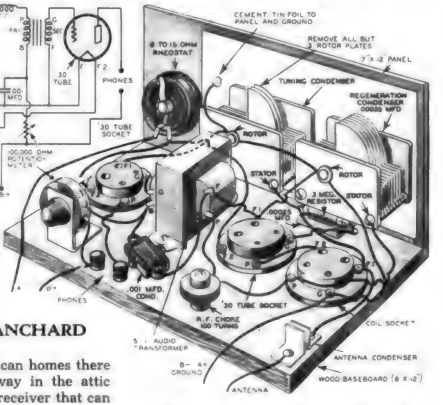
Tone Control

Tone of old battery radio receivers having noisy or tinny-sounding magnetic speakers can be improved greatly by connecting fixed condenser across speaker terminals. Each capacity of condenser, ranging from .006 to .1 mfd., will produce different tone. A selector switch which places different size condensers across the speaker makes an efficient and inexpensive tone control for your set.

Low-Cost Radio Gets Foreign Broadcasts



Circuit diagram of two-tube short wave receiver which can be made from old battery receiver parts, above.



Arrange parts on baseboard and panel as shown above. Tinfoil glued to back of panel prevents body capacity effects when tuning. Mount tube socket and plug-in coil socket as close together as possible, to keep grid leak leads short.

by **THOMAS A. BLANCHARD**

IN THOUSANDS of American homes there can be found, tucked away in the attic or basement, an old battery receiver that can be converted with little or no expense into a powerful short wave radio.

In the two-tube circuit given here all parts can be taken from one of these old T. R. F. 5-tube radios. All parts being mounted with machine screws rather than rivets, the set is very easy to dismantle.

In making the first tests with this low-cost receiver, on a Sunday afternoon, the first country to be heard from was Holland—and this with loudspeaker volume. In due time stations in Australia, Austria, England, Germany, and Canada, as well as the domestic police calls, plane and amateur broadcasts, ship messages, and trans-Atlantic telephone conversations were picked up.

The condenser used for the regeneration control is noiseless in operation, and easier to adjust for critical reception of weak stations. One of the condensers taken from the receiver may be used just as it is here.

For tuning in short wave bands all but three of the rotor plates must be either removed or broken off. Be careful not to bend any of the other plates; file down any projections on the broken plates to prevent short circuits.

New coils will have to be wound, but the wire used in the broadcast receiver coils can be used. The size of wire makes little difference, except that the larger the wire, the longer must be the coil form.

This set will take standard four prong plug-in coils. They can either be purchased or wound on old tube bases according to the specifications given in the Two-Tube All-Wave Radio article which appeared in the January, 1935, issue of MODERN MECHANIX AND INVENTIONS.

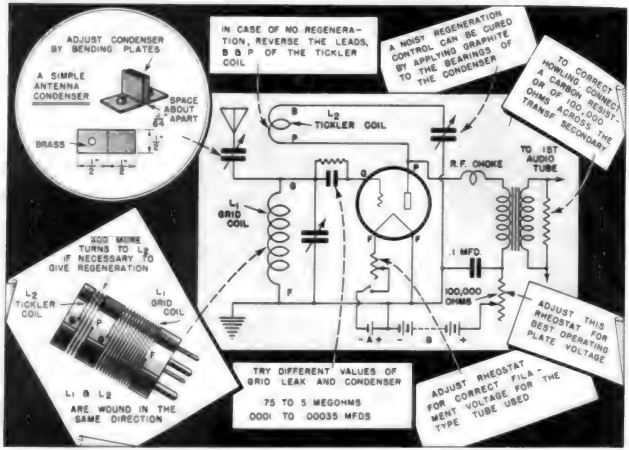
The antenna condenser, nothing more than two strips of brass or other metal mounted about $\frac{1}{32}$" apart, is adjusted once for maximum volume with the particular antenna you are using, then left alone. When tuning in very faint foreign stations, it may help a bit to adjust this.

Remember that the secret of foreign reception is patience in clearing up the carrier whistle, adjusting each control carefully until signals come in loud and clear. Little changes here and there in the parts used, in the spacing of wires, or in the spacing between coils are almost necessary when building a set from old parts. If results are disappointing at first, try and try again, changing tubes, coils, everything you can think of.

The audio transformer can be either 3 to 1

[*Continued on page* 118]

Locating Troubles in SHORT WAVE SETS



Common troubles of a regenerative short wave receiver circuit are labeled above, with their cures. Bookplate antenna condenser, construction of which is shown, is adjusted once if only one coil is used in set, then left fixed, since it merely tunes antenna to set. This condenser should be readjusted each time plug-in coils are changed, to get maximum volume and distance. Importance of proper coil connections cannot be stressed too much. Windings should all be in same direction.

THIS article will point out some of the more common mistakes made by radio fans in building short wave sets or converters. Many are the builders who thought they had followed diagrams exactly, yet obtained a set which gave very disappointing results.

First of all, if you are building a short wave receiver, a good aerial is necessary. A small antenna condenser, variable over a range of 5 to 35 mmfd., will materially increase the selectivity of the set.

If you are building a converter—this being simply a detector stage which feeds into the audio stages of your own radio set—do not expect good results if the set itself cannot get good distance. Midget receivers are seldom satisfactory for short wave work.

It will be impossible to get any regeneration if the tuning coils are wound or connected incorrectly. Be doubly sure that in winding your coils you make both tickler and grid coils turn in like directions.

If the set will not regenerate, reverse the connections to the plate winding of the plug-in coil. If this does not help, increase the number of turns on the plate (tickler) winding until the set does regenerate.

If just the right plate voltage is used in a regenerative detector, the set will be far more sensitive and easier to operate. For most tubes 45 volts is used; this may be varied by connecting a 100,000 ohm rheostat in the plate lead to the detector tube, and placing a .1 mfd. condenser from the rheostat to ground as shown in the above circuit. A filament rheostat will also help to control regeneration, if the detector tube is of the filament type.

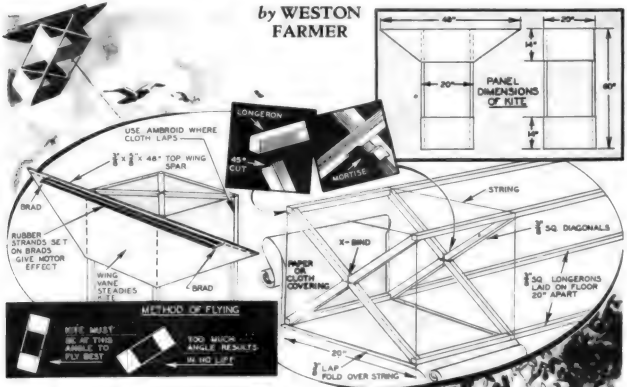
A carbon resistance of about 100,000 ohms, connected across the secondary of the first audio frequency transformer, will correct annoying howls due to feedback.

If the set works poorly, try different values for the grid resistances and capacities, ranging from .75 to 5 megohms and from .0001 to .00035 mfd.

If 2-volt tubes are used, never go over this voltage on the filament—from 1.5 to 1.75 volts will be better.

Fly "Jumping Jumbo"—A Winged Box Kite

by **WESTON FARMER**



THE airplane-like wings of "Jumping Jumbo" and the novel whirring rubber motor give her an airplane sound and appearance which will command the attention of your kite-flying friends.

Though a good five feet long, she weighs but ten ounces, and will rise right off the ground if given about 50 feet of string. The airplane wing principle which has been worked into her design makes for steadiness and a strong pull.

All the lumber you'll need for this kite can be ripped out of a piece of dressed white pine or spruce 1"x4"x8' long, free from knots. Carefully measure out and cut the kite frame, notching where indicated in the sketches. Tie the diagonals together with thin linen string or fine silk fishline, then fasten on the longerons by running the string all around the frame. Apply ambroid to shrink and lock the joints. Tie wing spar to the longerons.

Light silk or muslin, if doped to prevent the wind from leaking through, will be much more durable than paper for the covering. About fifty cents worth of acetone (airplane dope), sold at drug stores, is applied to the cloth after it is stretched over the frame.

Edges of the cloth are turned down over the strings and glued in place with ambroid. Run cloth down from the top wing spar as shown, to form the stabilizing wing.

Rubber strands mounted atop stabilizing wing vibrate in wind, drumming against kite covering to produce roar resembling airplane motor. Change tone of roar by adjusting tension of rubber strands. Take pictures of yourself from air, for kite will easily lift box camera. Release shutter with extra string.

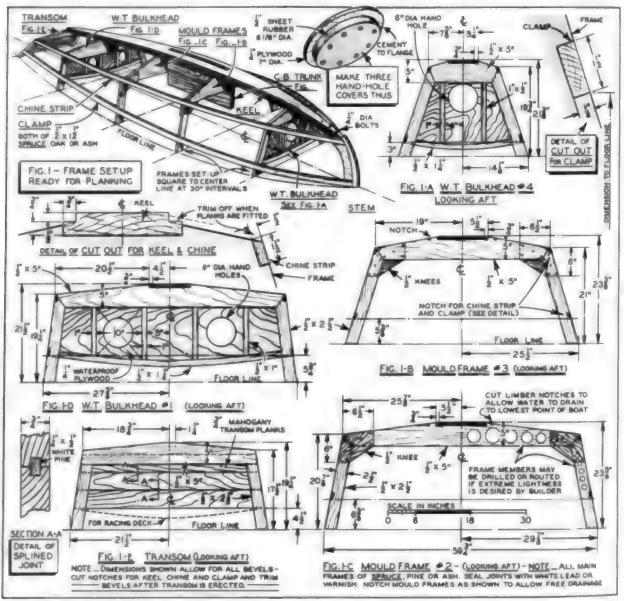
Proper way to rig harness for box kite is shown above. With slip knot, kite can be tested out on short hops until best pulling and lifting angle is obtained. Weight balance will take care of itself—that's the beauty of a box kite. Trolling line of about 25 pound test is recommended for your kite—it is not expensive, and will prevent kite from breaking loose.

"NOMAD"-an All-Purpose

WHETHER you like to sail, row, or putter along ahead of an outboard motor *NOMAD* will have a distinct appeal to the countless boat fans who spend their summers at inland lakes and rivers. As a rowboat she may be built without the sailing equipment. She may also be built as a little outboard cruiser without sails. She will also make a nifty little auxiliary cruiser in which two cronies may make an extended camping cruise. As a sailing racer I promise you that she will pass anything of her length.

NOMAD was designed light enough to enable two men to lift her to a trailer. Her construction was made simple enough so that the average man familiar with tools could put her together without a lot of work. The lap strake planking was chosen to produce a light and strong job that would stay tight even though the boat was alternately wet and dry.

If it is desired to build the boat as a rowboat the centerboard and rudder are eliminated, the utility deck is fitted and seats are installed as the builder may fancy. I would not eliminate the watertight bulkheads as these are a big safety factor in the design but the frame at station 1 may be made to seat height and the deck lowered in the stern to

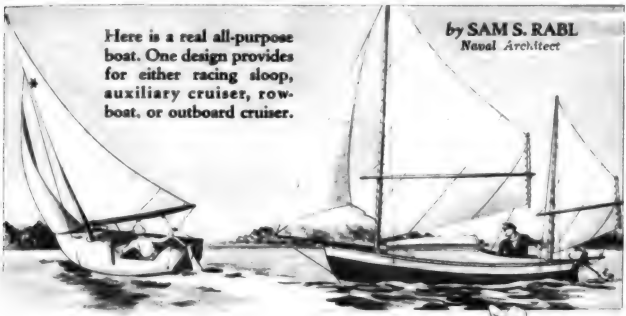


Laying out full size lines is unnecessary with this design. The dimensions of the frames are accurately determined to permit setting up the boat frame as shown in upper left. Note minor difference in transom for racing sloop.

BOAT for INLAND Waters

Here is a real all-purpose boat. One design provides for either racing sloop, auxiliary cruiser, rowboat, or outboard cruiser.

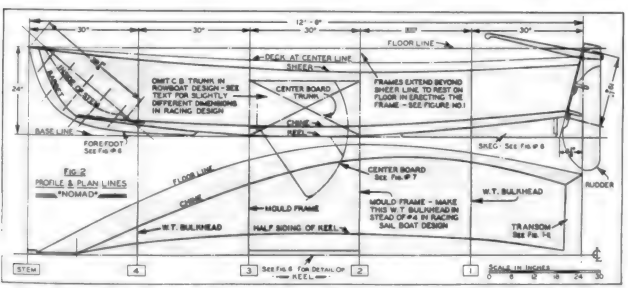
by **SAM S. RABL**
Naval Architect



the height that the usual stern seat is in the ordinary rowboat. If the stern seat is thought too long, a watertight bulkhead may be built at any distance that the builder may desire from the transom; and let this be the termination of his stern seat.

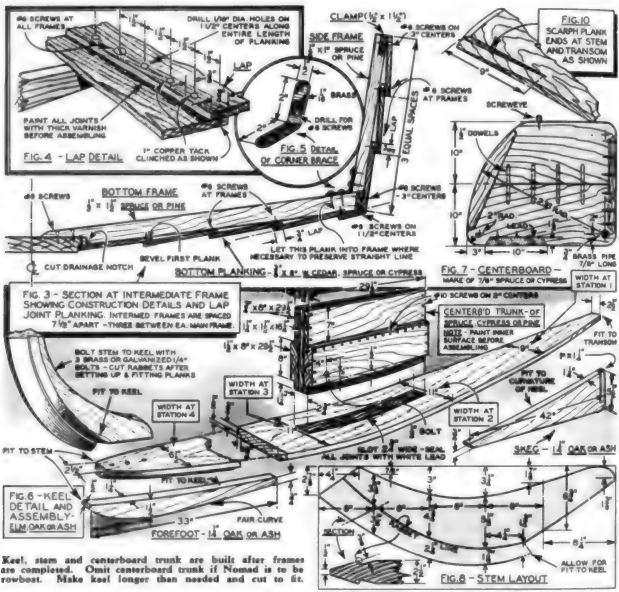
The outboard motor fits well into any of the combinations, the rowboat or the racer can have the motor mount screwed to the transom without any trouble but it is advisable to fit a bracket inside for strength. Remember that this boat was not designed as a racing boat for outboards and if any motor

Three of four possible versions of Nomad are shown above. The one not illustrated is the rowboat. At left above Nomad fitted as racing sloop; at right as ketch auxiliary cruiser; and above as an outboard cruiser with a cabin.



These simple profile and half plan lines with frame drawings on opposite page make construction of Nomad clear to anyone. Above drawing also serves as key to detail sketches which follow. Frames are extended to floor as shown.

These Drawings Plainly Show Planking and Fitting of Nomad's Keel



Keel, stem and centerboard trunk are built after frames are completed. Omit centerboard trunk if Nomad is to be rowboat. Make keel longer than needed and cut to fit.

over five horsepower is fitted she will squat badly. If extreme speed is desired forget about this design and select another more suited for this purpose.

As a racing sailboat, however, this boat will outclass many a boat of the one design type of the same sail area. The same pleasing lines that were incorporated in the hull to make propulsion easy will serve their purpose in racing. The use of hollow spars allows quite a bit of mast height to be added.

As a cruising boat *NOMAD* is at her best. If propelled by paddle, outboard motor, sail, or a combination of all three she has shallow enough draft to take her into the smallest streams. She will be able to be pulled up on the shelving banks of most any river or lake. With her folding cabin the cruisers can sleep on air matresses or place bedding alongside the centerboard trunk and with a mosquito net over the front of the cabin opening sleep better than in any tent that may be pitched ashore.

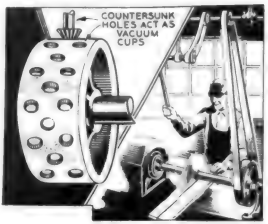
Before starting construction of *NOMAD* read these instructions and study the drawings carefully. Decide which of the four versions of its design will suit you most. Then note what slight changes are necessary for that version and finally start building.

In the construction of *NOMAD* most of the important details have been drawn in such a manner that the tedious procedure of laying out and fairing the lines full size will be unnecessary. We will endeavor to cover the construction of his craft step by step from

[*Continued on page* 126]

SHOP TOOL SUGGESTIONS

Holes In Pulley Face Stop Slipping

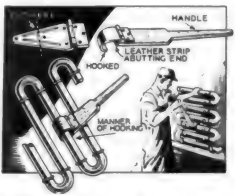


ON SMALL leather-faced pulleys the leather often is worn smooth, causing the belt to slip. To remedy this, make small holes all over the surface of the pulley with a brace and countersink. Do not go through the leather facing. These holes act as vacuum cups, gripping the belt enough to stop the slipping. This kink might even be tried on steel pulleys.—Vernon Tracey.

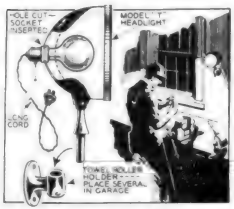
Old Grease Gun Used For Putty

PUTTY can be applied to windows and smoothed at the same time with an ordinary grease gun which has been ground down as shown in the sketches at the left. Hold the cup in one hand, press down firmly with the other, and gradually screw down the cap to force the putty out through the hole. The shaped point forms exactly the right bevel. Putty may be kept in the gun without drying.—A. H. Waychoff.

A Pipe Wrench That Works In Close Places



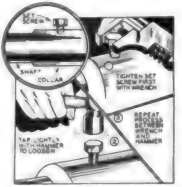
A PIPE wrench constructed as shown in the sketches will be found handy for work on steam or liquid coils made of light tubing, or in close places where the common pipe wrench would be too clumsy. Simply bend a heavy strap hinge as shown, after cutting off the tip, and fasten to a hardwood handle. The leather facing on the end of the handle gives a good grip without marring the work. —W. H. Arthur.



Novel Floodlight Illuminates Workbench

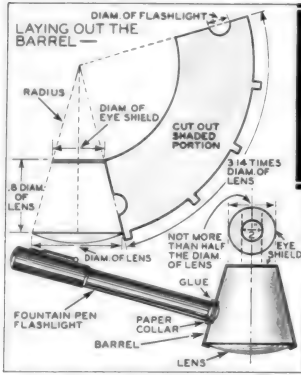
A POWERFUL adjustable light which can be moved to any one of a number of positions above your workbench is easily made from a Model T Ford headlight. Simply mount a 110-volt light socket in the back, and connect to an extension cord. Mount towel roller brackets in convenient locations to support the light.—B. Jenning.

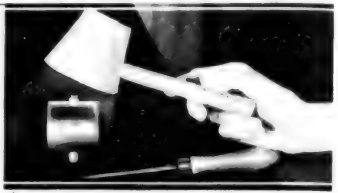
Set Screw Kink



TO TIGHTEN a set screw without shearing off the head, draw it up fairly tight with a wrench, then tap lightly with a hammer and pull on the wrench again. Repeating this process several times will take up the play in the threads enough to imbed the screw in its shaft, giving a much better grip than could be obtained with a wrench. The alternate tapping and tightening process might also be used on nuts.—K. B. Humphrey.

Self-Illuminated Magnifying Glass Throws Glareless Light





Fountain pen flashlight provides light, serves as handle for this self-illuminated low-power magnifier. At left are shown constructional details. Paint inside of barrel with glossy white paint or aluminum bronze. Replace eye-piece with second lens, set at correct focal distance, to increase power.

WHEN studying dark objects or working with poor illumination, you will find this combination magnifying glass and flashlight invaluable. The shape of the barrel and the use of an eye shield combine to eliminate all trace of glare.

The barrel is laid out according to the above plan, cut from either cardboard or sheet metal, and fastened together. Metal is preferred, as it can be soldered, and the tabs will be stiff enough to hold the lens in position. Dimensions depend upon the size of lens used. An auto taillight bulb connected to a doorbell transformer will give greater illumination.

Color Wheel for Movie Projector

Cut extra holes in film reel if more than three colors are desired for the projection of movies at home.

COLORED gelatin paper or different colors of cellophane placed between the sides of a compressed 100-foot film reel provide three or more pleasing tones which add interest to black and white home movie film presentations.

Mount Silhouettes for Book-Ends

PERSONAL snapshot silhouettes, mounted on stiff black cardboard and cut out with a sharp knife or jig-saw, lend a distinctive touch to the simple wood book-ends illustrated below.

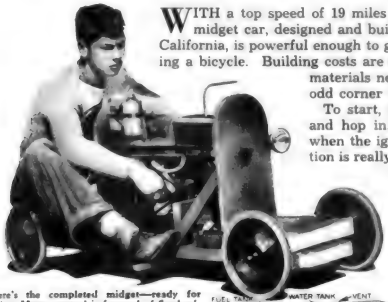
For small book-ends, having 2¼"x4" white pine bases and 4" square vertical pieces, the best picture height is around three inches. The cut-outs fit into grooves in the base and back, being held there by brads and glue. Use rubber cement in mounting photos.

Make two photo prints normal, two reversed, and mount back to back with cardboard between for silhouette book-ends.

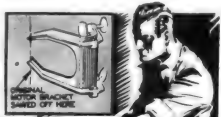
Outboard Motor Powers MIDGET CAR

WITH a top speed of 19 miles an hour, this outboard-powered midget car, designed and built by Hi Sibley, Jr., of Pasadena, California, is powerful enough to gain speed uphill even when towing a bicycle. Building costs are surprisingly low, for most of the materials needed can usually be found in an odd corner of the workshop.

To start, simply give the car a little push and hop in; the motor itself acts as brake when the ignition is shut off. Gas consumption is really very low.



Here's the completed midget—ready for action. Motor control is forward of flywheel.



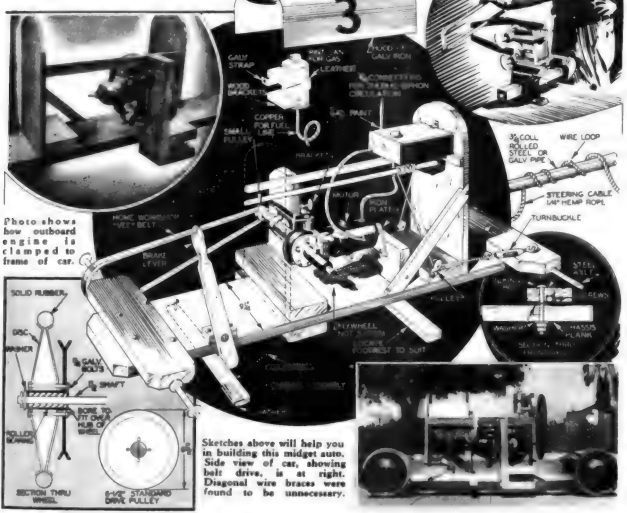


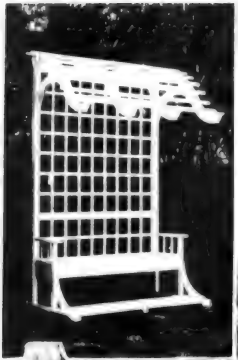
Photo shows how outboard engine is clamped to frame of car.

Sketches above will help you in building this midget auto. Side view of car, showing belt drive, is at right. Diagonal wire braces were found to be unnecessary.

Not stylish or streamlined, but compact and sturdy is this midget car design—intended for the youth who thrills to power and speed, yet hasn't a heap of money in his pockets. Motor crankshaft is cut off, and small V-pulley fitted to left end. Wheels may be taken from coaster wagon—large V-pulley is drilled out, bolted to one of rear wheels. Galvanized hood may be placed over motor. Steering wheel is from model T Ford, mounted on 3/4" galvanized pipe. Emergency brake has been added in drawings. Other details are covered, as you will note, in the above sketches. Idler pulley may be added.

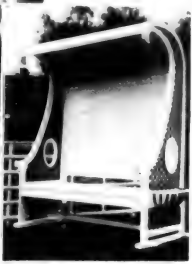
IDEAS FOR

These attractive garden seats, trellises, and pieces of rustic furniture will give an air of hominess to your back yard. Try at least one of them this spring.

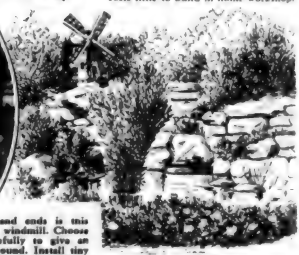


This rose arbor and garden seat do not take much time or money to build. The rustic chair (left) is made from saw mill slabs.

Fan-like trellises like that at left are ideal for roses, morning glories and other vines. Cypress is a good wood to use; apply a priming coat immediately, and double coat of white paint one day later.



Originality of design is the keynote of this garden seat. The arched back provides shade at all times, for seat is portable. Furniture like this hides unsightly corners of the back yard, yet costs little to build in home workshop.



Built of odds and ends is this miniature Dutch windmill. Choose its location carefully to give an attractive background. Install tiny electric lights, or even a floodlight.

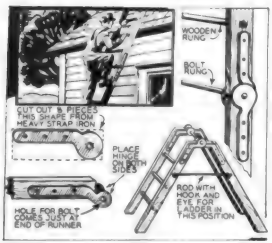
GARDEN FURNISHINGS

Trickling water gives cool, soothing atmosphere to any garden. Whether you have a little stream like this falling over rocks, or a fountain spray, plant ferns around it.

Who hasn't wished for a log cabin close by, for an occasional night out of doors? Though primarily built as a playhouse, this little cabin will accommodate two single cots and a table. In the sketch below, many of the ideas presented here have been combined with others to show a delightful back yard garden with pool and tiny bridge.

This rustic promenade walk leads from the front porch to a tree-nest large enough to seat a dozen people or a small orchestra in the shade.

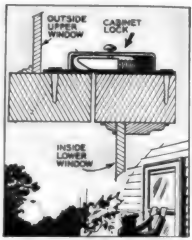
ABOUT-THE-HOUSE KINKS



Dual-Purpose Ladder Is Handy In Home

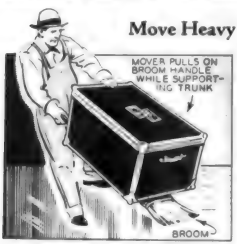
A LONG straight ladder may be used also as a stepladder simply by cutting hinges from heavy strap iron and bolting to the ladder as shown. The ladder must first be cut in half. The cross rod may be a long bolt, a rod or a pipe having holes in each end for cotter pins. The joint is exactly like that used in folding carpenter rules. A "hook-and-eye" rod braces the stepladder.—H. S. Anders.

Window Locks Automatically



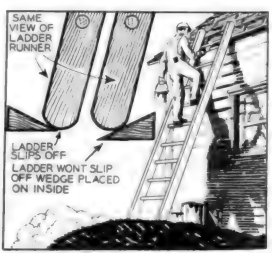
IF AN ordinary cabinet door lock is mounted on a window in place of the usual unit which must be given a half turn before it will engage, you need never worry about unlocked windows. The lock will click into place immediately when the window is lowered, just as it does when the cabinet drawer is slammed shut. With one hand lifting the window up, the other pulling back on the thumb latch, the lock is just as easily opened as the old type. Fasten the bolt part of the lock to the lower sash with screws. Screws also fasten the new catch to the outside upper window.—Sherley Reichardt.

Move Heavy Boxes or Trunks With Broom to Protect Floors



POLISHED floors or linoleum are usually scratched when moving heavy trunks or chests, the damage oftentimes being serious. By laying a common broom on the floor and resting one edge of the trunk on the broom straws, the other on the handle, one man can lift the trunk and move it easily across the floor or even up stairs. The work will be easier if the broom is raised as little as possible, and both broom and trunk pulled along.—W. A. Tempe.

Wedge On Inside Of Ladder Won't Slip



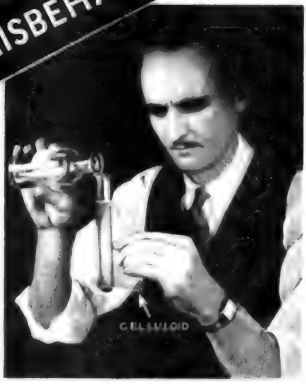
WEDGES are required on a ladder when one leg is not touching the ground, to stop wobbling when a man is moving up or down. To make the ladder steady, place the wedge on the inside of the ladder rather than the outside. Weight on the ladder presses it toward the building, making an outside wedge useless for this purpose. This may seem a mechanical paradox, but a trial will show clearly the advantages of the inside position in this particular case.—M. B. Edwards.

Mix unstable chemicals by rolling together on paper.

Small dabs of nitrogen iodide, placed on bits of paper as shown above, are allowed to dry thoroughly. When dropped on floor or otherwise disturbed, the little scraps of paper will explode.

COMMON CHEMICALS THAT MISBEHAVE

by
KEN MURRAY



When mixing unstable chemicals, hold test tube inside fold of thick sheet celluloid. This will not hide action taking place, but will protect hands and face against flying glass.

FOLLOWING textbook instructions in performing chemical experiments at home may be conducive to safety, but the real thrills of research come from those experiments which you work out for yourself.

Certain chemicals just do not get along well together, and can misbehave in a manner which may cause acute embarrassment—and pain. To avoid accidents, keep the following list of chemical tricksters in mind whenever you venture into free-lance experimenting.

IODINE mixed with ammonia water forms a brown sludge at the bottom of a test tube. This is nitrogen iodide; when a piece the size of a pin head is dried on paper, it will explode with a very loud bang at the slightest jar. Larger quantities explode of their own weight before becoming powerful enough to do damage. Never add volatile oils to crystals of iodine—they will fulminate, and explode.

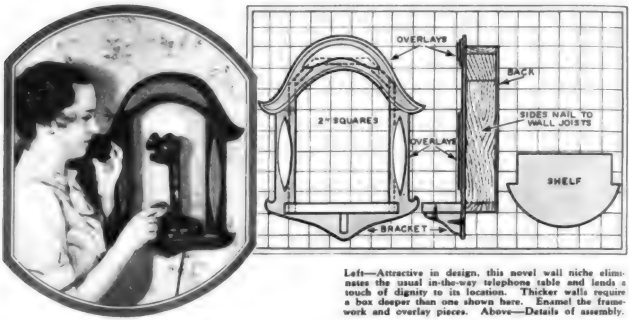
HYDROCHLORIC ACID mixed with nux vomica is an unstable solution, liable to break its container several hours after mixing.

COPPER NITRATE which is perfectly dry is unsafe to pound with a hammer or pestle.

SULPHURIC ACID mixed with oil of

[*Continued on page* 122]

Wall "Nest" for Desk-Type Telephone Is Useful Project



Left—Attractive in design, this novel wall niche eliminates the usual in-the-way telephone table and lends a touch of dignity to its location. Thicker walls require a box deeper than one shown here. Enamel the framework and overlay pieces. Above—Details of assembly.

THIS Oriental wall niche for the telephone is easily constructed and adds beauty to your home. The frame is made of five pieces of 1 by 3½ in. stock, assembled with corrugated fasteners. The 1-in. bracket is screwed to the shelf, both of which are next inserted in the frame. A large face piece and four overlays, cut from ¼-in. plywood or prestwood, are nailed or glued on. After adding the plywood back, locate a wall joist near the telephone cord, outline the frame on the wall, remove the plaster, cut the laths with a keyhole saw and mount in position.

Wood Box Built In Side of House

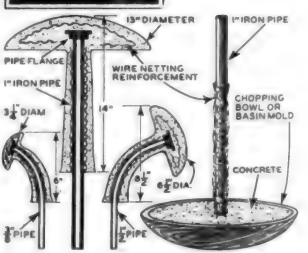
Two-way fuel bin keeps floors tidy.

A PRACTICAL-MINDED resident of Peach, Washington, has solved the wood-carrying problem in his own home. Cutting an opening in the rear wall, he has inserted a lid-covered, sloping bin which is filled with wood from the outside and removed from the inside. Such a box shuts out cold weather and keeps the kitchen floor clean.

Toadstools Used As Garden Seats

GIANT-SIZED toadstools make novel lawn seats. The caps are cast in ordinary mixing bowls, while stems are formed around iron pipe, reenforced with wire netting. Use 1 part cement, 2 parts sand and 3 parts crushed stone or gravel. Screw on pipe flange end to insure firm anchorage. Smooth with a coarse file.

Drawings below show cross-sections of toadstools at left. To cast, spread concrete layer in form and cover with netting. Stand stem pipe in center filling in around flange. Level off about ½" below rim of form and imbed projecting wire edges in concrete. Let cast caps set for three or four days.



PAPER NEGATIVES Reduce Cost of Copy Work

Photos show steps in printing or enlarging from paper negative. Above—Coating back of negative with xylol to increase translucency. Extreme right—Making photostat by mirror to prevent getting a reversed image.

BY BORROWING the paper-negative process from the pictorial photographer, any amateur can produce strikingly clear photographic records at surprisingly low cost.

Suppose, for example, you wish to copy these pages and file them away for future use. You have, perhaps, a 4 by 5 in. camera equipped with cut-film holders and a ground glass focusing screen. Buy a dozen sheets of 8 by 10 in. bromide enlarging paper of single weight and cut into 48 pieces measuring 4 by 5 in. Since two sheets are needed to produce a positive copy, the cost per copy will average 2½ cents or approximately one-third of the cost of using film.

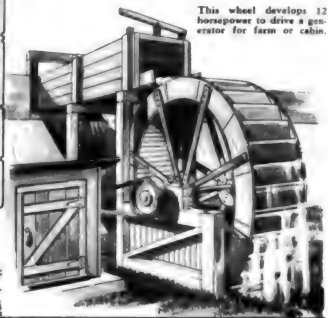
With film holders loaded with bromide paper, take your picture in the usual manner, allowing a somewhat longer exposure. Develop and ferrotype to prevent wrinkling of the print. You now have a negative on translucent paper instead of transparent glass or celluloid. Although a positive print can be made from the paper negative without further treatment, it is better to rub linseed oil into the back to make the negative clearer and prevent paper texture from showing too prominently. Castor oil, containing a drier, or Canada balsam, which microscopists employ for slide-making, thinned with xylol, will be satisfactory. Even xylol can be applied with a cotton wad. After the liquid has penetrated the fibers, make your print, placing the emulsion side of the paper negative against the sensitized surface of another sheet of paper.

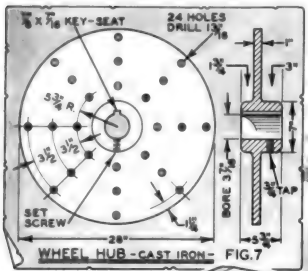
To make copies resembling photostats, simply place a large mirror at a 45 degree angle before the camera lens and lay the printed matter on the table beneath the mirror.

A Water Wheel to Generate

by JOHN S. CARPENTER
Hydraulic Engineer

This wheel develops 12 horsepower to drive a generator for farm or cabin.





WHEEL HUB - CAST IRON - FIG. 7

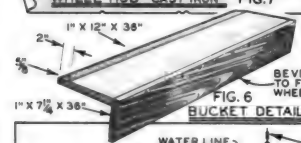
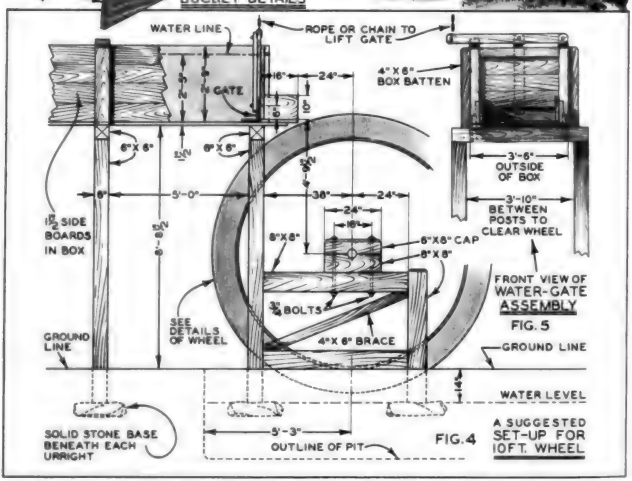


FIG. 6 BUCKET DETAILS



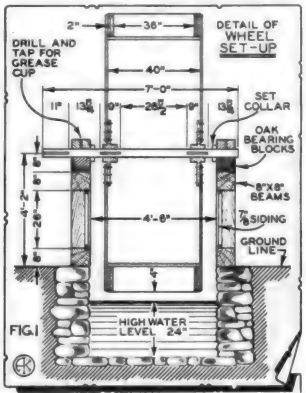
Only castings needed are two wheel hubs shown in Fig. 7. To make joints water tight and protect wheel and frame from rot cover assembly with pitch. Put the wheel as cloud to dam as possible. Stones under posts prevent settlement.

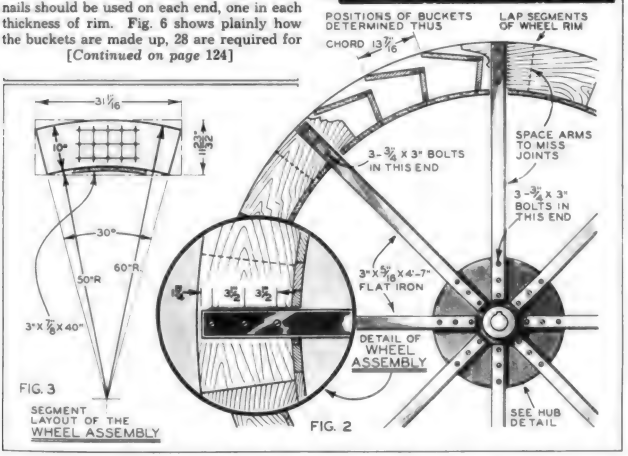
Power for Summer Cabins

SO MANY requests have come in from M-M water power fans that we now offer plans and specifications for a 10-foot diameter overshot wheel that has a maximum capacity of 12-horsepower, 12⅞ h.p. by test computations at a speed of 15 r.p.m. This wheel can drive an 8-KW generator and a 1½ h.p. water pump or 16-inch saw with the gate full open; in other words, everything on a sizable farm or small estate. As the power can be very nicely adjusted to suit either the load to be carried or the water supply flowing in the creek, its operation will be very economical; the only cost is oil and grease to lubricate.

The rims are made in 12 sections (Fig. 3) for each thickness and there are two thicknesses per complete rim. This construction allows the boards to overlap half way into the next board, so that when nailed on 3-inch centers, a very stiff construction is given. Nail in the 3"x40"x⅞" boards (Fig. 3) for the inside curve, as tightly as possible together; 105 pieces being required; used lumber, if free from knots, can be used for this. Four nails should be used on each end, one in each thickness of rim. Fig. 6 shows plainly how the buckets are made up, 28 are required for

[*Continued on page* 124]





Wheel segments do not have to be smooth dressed. Rough stock will hold pitch better. Paint each board before nailing, giving wheel final coat after assembling to prevent rot. The wheel segments (Fig. 3) are cut from 12" stock.

Sponge Rubber Scraps Make GAY Novelties

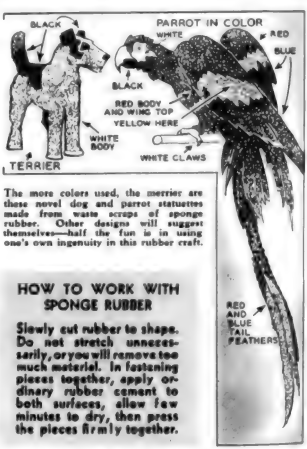
by BORIS I. BITTKER

NOVELTY articles ranging from simple and useful soap containers to amusing and colorful comic cartoon characters are not hard to make from sponge rubber. It is very easy to work with this material, which can be obtained in a multitude of colors, shapes, and sizes. The only sculptoring tools needed are a pair of scissors and a jar of rubber cement.

Sponge rubber may be obtained at your local five and ten store in the form of mats and kneeling pads, but it is more economical to buy scraps, which are sold very cheaply by the manufacturers of sponge rubber objects. These scraps are the unused portions left after stamping out commercial products, and come in pound or ten-pound lots, in irregular pieces of different sizes.

The soap container is an easy project for the beginner, as it consists of only two pieces of different color, one hollowed out to form a bowl, the other simply a ring which serves as rim.

[*Continued on page* 122]



The more colors used, the merrier are these novel dog and parrot statuettes made from waste scraps of sponge rubber. Other designs will suggest themselves—half the fun is in using one's own ingenuity in this rubber craft.

HOW TO WORK WITH SPONGE RUBBER

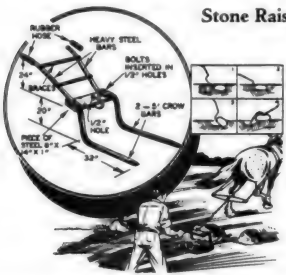
Slowly cut rubber to shape. Do not stretch unnecessarily, or you will remove too much material. In fastening pieces together, apply ordinary rubber cement to both surfaces, allow few minutes to dry, then press the pieces firmly together.

SPRING GARDENING TIPS

Convert Flower Pots Into Attractive Bird Baths

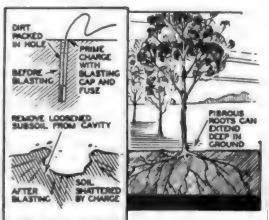
FLOWER pots of almost any size make low-cost bird baths which, scattered here and there about the lawn and garden, will attract a host of feathered friends during hot summer days. A thin tapered pole cut in a nearby woodlot or turned down on the lathe is forced through the drain hole of the pot from the bottom, as shown at the right, the cross piece nailed on, and the bath set into the ground in some shady corner of the garden—Jenning Berge.

Stone Raiser Clears Ground



A MAN with one horse can in half an hour put more rock on the surface with this simple stone raiser than he could in an entire day with pickaxe and crowbar. Use it like a plow or scraper, just as in sketches 1 to 4 at the left. Large rocks which are too heavy to load can be dragged right off the field; others can be left on top, to be picked up later. The frame is shaped from two crowbars as shown, the pieces being heated first. Handles and braces, all of steel, are bolted together and to the one-inch thick steel plate to which the clevis is attached. The chain should be twice as long as the handles.—E. Williams.

Dynamite Digs Holes for Tree Planting



BLASTING of holes for tree planting will prove effective in dry clay soils. Trees planted in this manner show a decided increase in growth over those planted in holes dug in the earth. The compact subsoil is shattered, permitting the fibrous roots to extend to wider and deeper areas for food and moisture. A bore hole is punched in the ground, and loaded with a half or whole cartridge of dynamite. A so-called agricultural dynamite, which gives a shattering effect without blowing out the soil, is excellent to use. The charges are primed with blasting caps and fuse, and set off in the usual manner, after the holes are well tamped with earth. All of the loosened subsoil should be removed from the blast cavity, the tree planted, and the hole filled with top soil and fertilizer.—M. R. Rowland.

Plant Vines In Flower Box Mounted On Gate

IN GARDENS where a wood picket fence completely surrounds the plants, vines are usually planted along the fence. By mounting a simple flower box at the bottom of each swinging gate, and setting in vines or morning glories, the gate can be almost entirely concealed, and made to harmonize with the rest of the fence.—S. B. Libb.

BUILDING the ROOF of

Sir Guy Standing rests on the open bunk of his trailer. The tent-poles hold the bunk flap up.

This light trailer will cut your touring costs in half. Modeled after the design of Sir Guy Standing, movie star, this trailer can hold four to six persons. This installment completes its construction.

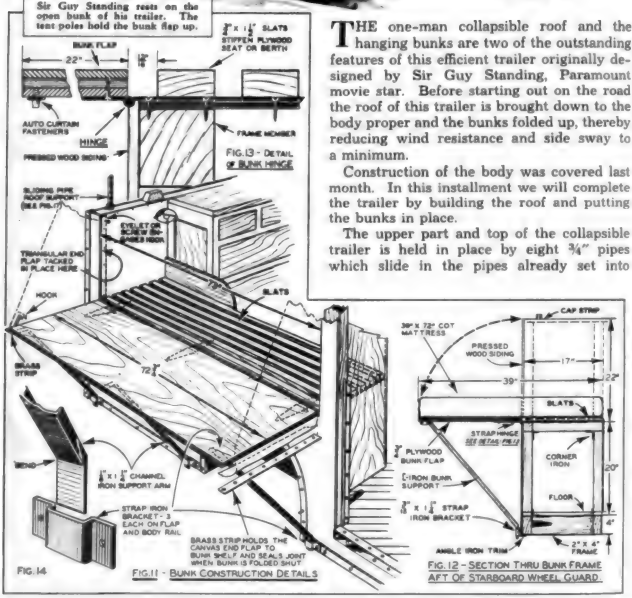
by JACK SMALLEY

PART II

THE one-man collapsible roof and the hanging bunks are two of the outstanding features of this efficient trailer originally designed by Sir Guy Standing, Paramount movie star. Before starting out on the road the roof of this trailer is brought down to the body proper and the bunks folded up, thereby reducing wind resistance and side sway to a minimum.

Construction of the body was covered last month. In this installment we will complete the trailer by building the roof and putting the bunks in place.

The upper part and top of the collapsible trailer is held in place by eight ¾" pipes which slide in the pipes already set into



The bunks are swung out and supported with channel iron arms while in camp. When traveling, bunks fold up flush with body. A standard cot mattress can be used and stored inside when on the road. A divided mattress is better.

Your COLLAPSIBLE Trailer

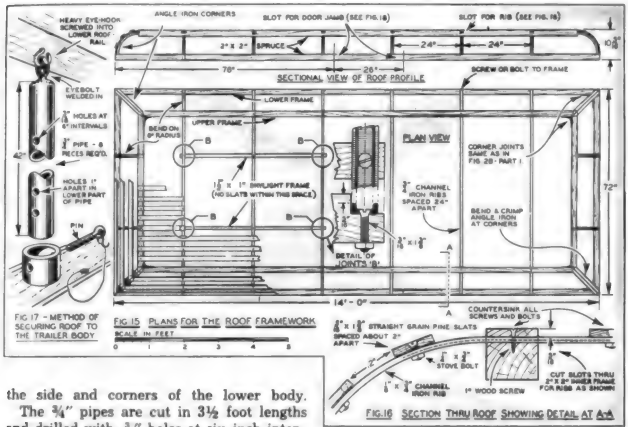


FIG. 17 - METHOD OF SECURING ROOF TO THE TRAILER BODY

FIG. 15 PLANS FOR THE ROOF FRAMEWORK

SCALE IN FEET 0 1 2 3 4 5

FIG. 16 SECTION THRU ROOF SHOWING DETAIL AT A-A

Complete layout of the roof framework is shown in the above drawings. The channel iron ribs should be heated red hot and bent slowly over a form with a sledge hammer.

the side and corners of the lower body.

The ¾" pipes are cut in 3½ foot lengths and drilled with $\frac{25}{64}$" holes at six-inch intervals. A heavy eyebolt is welded into the top of each pipe and it is attached to the lower roof rail by a large eyehook. The smaller pipes slide in the larger ones and when you raise the top you hold it up by pushing a large nail or cotter pin through the holes.

To raise the roof, one end is lifted about six inches and pegged, then the other end is raised 12 inches, and so on until the top is in position. After raising top to test it for position, mark the smaller pipes, remove and drill additional holes about one inch apart to provide a means of adjusting the tension of your canvas in case it should stretch or shrink, or in case of slight errors made when sewing the canvas. Details of the upper pipe and pin are shown in Fig. 17.

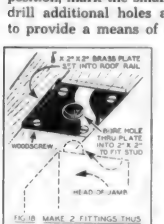


FIG. 18 MAKE 2 FITTINGS THUS

This detail shows how door jamb stud is fitted into a metal plate in the roof rail.

Before proceeding with the roof however it is well to complete your bunk flaps. As previously explained, the bunk foundation rests on the locker seats and projects, on hinges, from the trailer body. The hinged portion which is fully covered in Figs. 11 to 14, can be built up to suit or as shown with a simple sheet of ¾" plywood. Place auto curtain fasteners under the bottom edge of the flap. These are to hold the bunk curtain when bunk is extended or the rain flap when top is down and bunk folded.

Channel iron or angle iron braces are used to support the bunks when open. Make three for each side bending each end of the brace as shown and cutting off the flange where the iron fits into the bracket. Six strap iron brackets are needed for each bunk; three being attached to the under side of the shelf and three to the lower body moulding. Bolt or rivet them in place.

The bunk foundation shown is designed to accommodate a standard 39"x72" cot pad. Sir Guy uses a specially made mattress and those who feel like spending the extra money will find that a divided mattress is handier and will solve the otherwise difficult problem

Compact Movie Star's Trailer Provides All Comforts for Auto Tourists

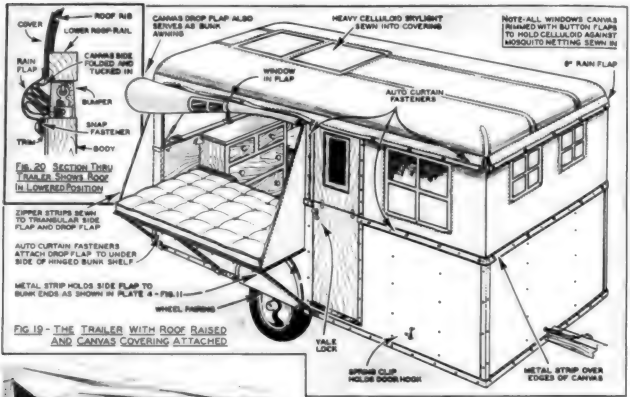


Fig. 20 Section Thru Trailer Shows Roof In Lowered Position

Fig. 19 - The Trailer With Roof Raised And Canvas Covering Attached

Sir Guy Standing, Paramount star, uses his trailer for fishing and painting expeditions. Here he is painting in the shade of the bunk curtain supported by tent poles.

Canvas sides are held firmly to body by metal moulding. Curtain rolls down and fastens underneath to cover bunk completely or can be raised on tent poles. Celluloid windows can be removed letting in air through netting.

of stowing the mattress when the bunk is folded.

Now for the roof. Your first consideration in making the roof is to lay out the two frames (see Fig. 15), which are of 2"x2" spruce. The inner frame stands about 8 inches above the lower and is attached to it by means of channel iron ribs which are spaced 24" apart.

These ribs should be bent on a radius of 8 inches as shown. The easiest way to accomplish this is to heat the iron red hot, clamp it at one end and bend it over a form with a sledge hammer, bending slowly. Of somewhat larger width and of angle iron, the corner pieces are bent and crimped to provide smoothly curved supports at each of the four corners of the roof. For the slats use straight grain pine, $1\frac{5}{8}$" wide by $\frac{1}{4}$" thick, to run lengthwise of the trailer top. As shown in Fig. 16 the ribs are run through the top frame members so that slats are flush with this frame when bolted in place. Use stove bolts to attach the slats.

It is advisable to leave out the slats within the space indicated as the skylight which is later sewn into the canvas covering at this point. A skylight frame is shown but is not essential as the slats themselves are sufficient edging at this point.

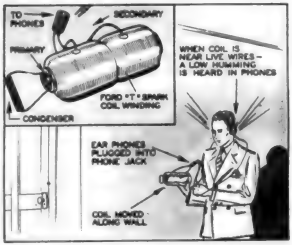
Now attach the upper pipes to the outer roof frame and raise in position. This is your final checkup before putting on the canvas and it is at this time that you mark off the upper pipes and drill the additional holes mentioned previously.

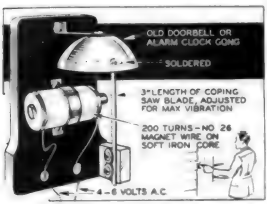
[*Continued on page 120*]

ELECTRICAL EXPERIMENTS

Device Detects Hidden Power Wires

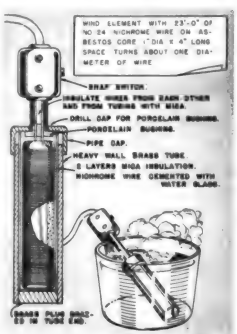
THIS home-made house wiring detector consists of a Ford spark coil with the wooden sides removed, and the pitch carefully chipped off until just the windings remain. The primary and secondary leads are then scraped carefully, and a .1 mfd. condenser soldered across the primary. The secondary leads are soldered to the terminals of a phone jack. With headphones plugged in, and the detector placed near a pair of live wires, a low hum will be heard in the phones.—S. J. Marzycki.





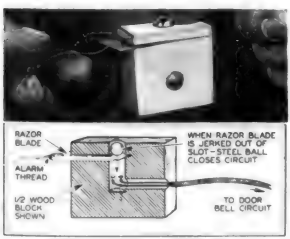
Electric Bell Has No Contact Points

A VIBRATING reed tuned to the exact frequency of the A. C. supply produces a pleasing musical tone in this novel door bell. Construct as shown at the left, connect to a doorbell transformer, and adjust the reed length.—C. D. Savage.



Electric Water Heater Is Built Into Pipe

A LENGTH of brass or iron pipe, with a brass plug brazed into the lower end, forms the inexpensive housing for this electric water heater. Inside is placed a nichrome heating coil, wound about an asbestos or porcelain core and carefully insulated from the pipe with asbestos cloth. The switch may be mounted directly on the heater, as shown at the right, or placed in the cord. In either case be sure to make the unit waterproof with a heat-resisting cement or water glass. With this heater a pan of water can be heated quickly.—C. R. Adams.

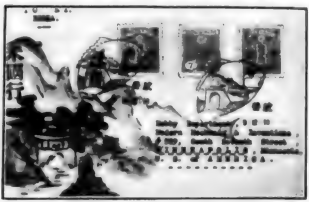


Falling Ball Rings Burglar Alarm

THIS simple alarm can be used either at doors or windows, or even to give warning when an intruder crosses the room. A fine black thread is stretched across any entrance, and attached to a razor blade slide in the contact block. When the thread is brushed against, the slide is pulled out, allowing the steel ball to fall against two contacts in the doorbell or alarm circuit.—K. Murray.

WITH THE COLLECTORS

Scrap parts produced this accurately scaled model of locomotive hauling Twentieth Century Limited. Builder is E. T. Brown of Chicago, a violinist. There are 3,862 pieces.

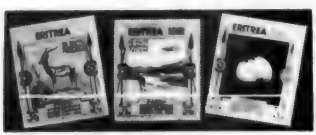


Collecting artistic covers like that above from Korea, having a naval flying fish cancellation, is another unusual hobby.

UPSIDE-DOWN HOBBIES

HAVE you an upside-down collection? Is your hobby unusual enough to be classed as upside-down—an outcast among the more sedate hobbies? If so, tell the Hobby Editor about it, in 200 words or less, and send along a photograph or two. Just as a little reward for your work, there'll be cash prizes of $5.00 for each hobby entry found suitable for publication. Include return postage if you want the entry back. Address the Hobby Editor, MODERN MECHANIX Publishing Company, Minneapolis, Minnesota.

Truly upside-down is a collection of stamp watermarks, for here the backs of the stamps must be displayed.



Colorful and picturesque are these, latest airmail stamps from the little Italian colony of Eritrea. (Shown half-size.)

Germany uses stamps for political purposes. Center: Stamp issued before Saar plebiscite vote, implying territory is already in German hands. Right: Victory stamp, inscribed "The Saar Comes Home". Left: Swastika sun rising from behind ancient castle of Nuremberg. Nazi party convention site.

Among unique hobbies is that of Margaret Simms, 21-year-old Venice, California lass, who ties knots in spare time. This display of 167 different knots took her 8 months to complete.

See the country's glorious beauty spots and famous historical places. Visit our great National Parks. Cross the Appalachians or the Rockies. Explore the battle fields where our heroes fought and died. Select your own routes — travel when you feel like roving — linger when you wish — with no set time tables or schedules to follow.

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Two-in-one Hobbies—Collecting Photos for Stamp Album

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Robert E. White, of Drayton Plains, Mich., being a railroad man, collects only those postage stamps which show some phase of railroading. He takes his own photographs of different types of locomotives, exchanging extra prints with foreign collectors, to mount with the stamps in albums.

In all there are over 1100 stamps covering railroading. The first, issued in 1860 by New Brunswick, shows a 4-4-0 locomotive. A 3-cent blue stamp issued in 1869 was the first U. S. stamp to show a locomotive.

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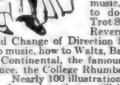

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The Inside Story of Shoes You Wear

[*Continued from page* 83]

be moulded to the shape of the human foot.

A last of proper size is pushed up under the unformed shoe-upper and a workman, holding it firmly, fits it into the jaws of the complicated machine. The machine clicks, snaps and drops the upper and the last, now one, into the attendant's hand.

After the insole has been fitted firmly, though tentatively, to the bottom, the welt is put on. The welt permits attaching the sole to the upper.

To eliminate shoe squeaks and leaks, a worker at a roaring furnace removes some hot, sticky ground cork insulation and spreads it over the surface.

A metal arch-base, which prevents shoes from losing their shape when worn, is next fastened to the bottom. An iron-jawed instrument speedily sews the heavy sole on the welt, and the shoe passes on to the heel-man. The heel is attached with nails driven upward. The edges of the shoe are trimmed, buffed and painted and the bottom of the sole is polished with fine sandpaper on a roller.

After laces are inserted in the eyelets, the finished shoes are then packed in boxes, ready to challenge the weight of the toughest shoe-wearer-outer.

Low-Cost 2-Tube Radio

[*Continued from page* 91]

or 5 to 1 ratio, the higher ratio being best.

With type '30 tubes two dry cells are needed for the filament supply, the rheostat reducing this to the correct value of 2 volts. The tubes should be operated with the filament at a just barely visible red glow.

Better results are possible if the amplifier tube filament is operated at 3 volts instead of 2 volts, though the life of the tube will be shortened. This is easily done by connecting the F2 lead of the amplifier tube to the other side of the filament rheostat.

A little experimentation will be required with the plate batteries; try 45, 67½, and 90 volts, using whichever gives the best results.

Connect the set to any good 100-ft. aerial and good ground, turn on the filament, and adjust the regeneration control. There should be a faint hum, this getting louder as the regeneration control is turned and at its peak going into a "plop." Adjust for the loudest hum, then start tuning. Every whistle is a station. Once a station is heard, make the necessary adjustment of the potentiometer at the back of the set, controlling plate current to the detector tube, for loudest volume, and adjust the antenna condenser. If no regeneration hum can be noted, reverse the connections to the terminals P and F2 on the coil socket.

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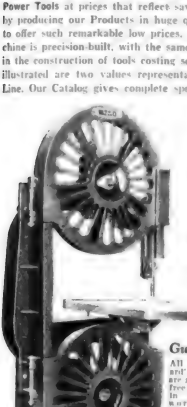
View of straight line-production—
2500 "Wood-Wizard" Band Saws



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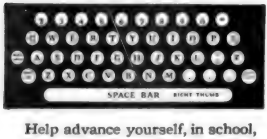

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Completing Your Collapsible Trailer

[*Continued from page* 112]

If you are going to sew the canvas covering yourself the windows will probably be your chief difficulty. If in doubt, have them made up by a tent and awning company.

Windows should be canvas rimmed with button flaps to hold the celluloid squares against the mosquito netting which is sewn into the canvas. The skylight, of extra heavy celluloid, is sewn into the covering.

Fitting Canvas Sides and Top

Around the entire edge of the canvas top sew a 6-inch rain flap and insert auto curtain fasteners as shown (Fig. 19). When the top is lowered this flap fastens to fasteners set on the trailer body to hold all snug and tight.

The canvas sides are attached to the lower body by the moulding which is now applied. To fit, first lay the canvas and raise the roof to the proper position. Then draw the sides through the moulding (which is preferably of metal) until it is taut and screw down tight trimming off the extra canvas with a razor blade. Auto curtain fasteners are placed along the moulding to correspond with those set along the rain flap.

After fitting the canvas top you can install your bunk curtains. They are comprised of two tri-angular side strips and a curtain which is sewn to the top and attached to the side strips by lengths of zipper stripping which is sewn to the canvas. A window is located in the main flap and auto curtain fasteners set into the lower edge coincide with the fastener on the under side of the bunk shelf.

Poles Hold Up Bunk Flaps

Tent poles, which are easily packed inside when traveling, and guy ropes raise the flap as a sunshade when set up for camp, as shown in the photographs.

A chest of drawers, such as is shown in the illustrations, is a necessity rather than a luxury and can be simply built. Sink, stove and icebox you will arrange to your own satisfaction and purse. A folding table can be strapped to the inside of the roof when not in use.

Lights will be needed of course and you should install an outlet plug to carry a lead to your car battery. Or you may pick up and install a battery in the trailer itself.

For added rigidity in high winds you will do well to install light guy wires criss-crossed at either end of the trailer from roof frame to body. These are not shown in the drawings but are easily installed. An inexpensive turnbuckle on each guy wire should be incorporated in the bracing.

Heavy duty auto jacks with hardwood blocks attached to the bases prop up your trailer in camp. Place one under each corner.

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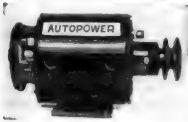

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Sponge Rubber Scrap Novelties

[*Continued from page* 108]

Many uses can be found for the attractive inlaid mats—under bowls, ash trays, telephones, book ends—under radios to reduce vibration—as bathmats, shoe and hat polishers (cement the mat in the form of a cylinder to fit around the hand)—and in the workshop for tools and as vise grip pads for protecting delicate work.

The elasticity of the rubber makes inlay work simple; cutting the inlay piece slightly oversize insures a good fit.

Bathing sandals can be made from sponge rubber at small cost. If the sandals are to be worn on rough ground or on a stony beach, it is advisable to make a sole of fiber or leather first, then cover with sponge rubber. On a sand beach or in the pool this protection is not needed.

Slippers made from sponge rubber are comfortable and easy to make; the thicker the sole, the greater will be the resiliency of the slippers. Careful gluing of the pieces, especially around the toe, will improve the appearance considerably.

Thin sheets of sponge rubber make novel purses. One flat sheet is folded for the outside, and a piece of different color cut for the inner partition. The tab of the flap is slipped through slits in the rubber.

Sponge rubber initials or designs may be either glued or inlaid on any of the above novelties, and add a distinctive personal touch to the product.

Common Chemicals That Misbehave

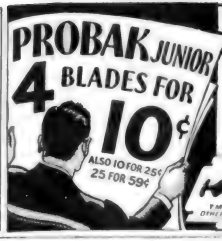
[*Continued from page* 103]

turpentine may explode. When sulphuric and nitric acids are mixed, never add hydrocarbons in any form. Even the addition of sugar syrup will make a compound which may become extremely undesirable.

CHLORATES, particularly potassium chlorate, are very unstable and combine explosively with other common chemicals such as sulphur, sodium hyposulphite (ordinary photography hypo), tannic and oxalic acids, iodine, and potassium permanganate.

POTASSIUM PERMANGANATE will cause spontaneous combustion when mixed with either glycerine or oxalic acid, or with a mixture of alcohol and distilled water. To show the danger of this chemical, mix ten grains of the permanganate with five drops of sulphuric acid; place a little on a glass rod, and touch to a bit of cotton soaked in alcohol. The cotton will ignite immediately.

ANTIMONY SULPHURET, the chemical which provides the crackling sound in Fourth of July "heel-crackers," must be mixed carefully with other chemicals. Particularly avoid mixing it with a chlorate.



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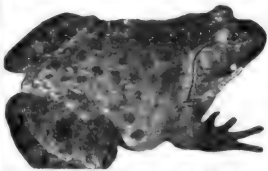

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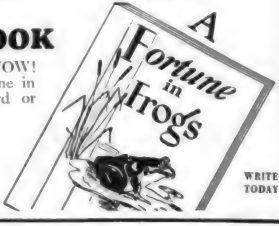

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A Water Wheel To Generate Power

[*Continued from page 107*]

best results. The width gives the power—half width will give half power.

Fig. 2 shows an assembly of the wheel with arms and cast iron hub bolted to the wood rim. The buckets can be notched out to clear a bolt head or nut should they happen to interfere. Space the arms so that both inside and outside joints in the wood rims are missed, for a joint will weaken if bolts go through it.

Fig. 1 shows a cross section through the wheel as placed in the discharge pit. You can use dry rubble walls for the sides of the pit if you have fairly large stone, and the bottom of the pit can be floored with thin flat stone to save it from washing out. Place the shaft so that the bottom of the wheel will be about four inches from the highest level of the water in the pit.

Oak Blocks Make Good Bearings

Oak blocks can be used as bearings, making a durable and cheap construction. The shaft can be bought second hand, and any machinist will cut the keyways for you at low cost. Should you have any difficulty getting the shaft and cast iron hubs write to MODERN MECHANIX AND INVENTIONS and a manufacturer will be recommended. Using oak bearing blocks, tap into the top of the bearing for a threaded grease cup, but drill the hole about $\frac{1}{32}$-inch smaller than the thread measures, so the thread will be tight in the wood.

Fig. 4 shows a framing detail for the support of the water box, or flume. Use ½-inch or $\frac{5}{8}$-inch lag screws to make strong joints in the frame. The planking of the water box should be 1½-inch rough dressed material, tongue and grooved if you can get it, or else be sure to nail up the joints tightly to avoid leakage of water. A good plan is to smear each joint with heavy pitch as you nail up.

Assembling the Bucket Wheel

Fig. 2 shows how the buckets are spaced in the wood rims. It is advisable to plane off the lower seat of the bucket, where it rests on the inside curve of the rim, in order to get a better water tight job. A detail of the cast iron wheel hub is given in Fig. 7. You can either have this cast at your local foundry, or you can buy it all bored and drilled ready to mount. There is no other machining than shown. The sides of the wheel hub will be cast smooth enough for the side bars, if you tell the foundryman what you want.

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Rebuilding Human Bodies

[*Continued from page 56*]

teria were killed by substances having little harmful effect on bodily tissue. The aim now is to prevent the entrance of bacteria, rather than to destroy them.

Before a surgeon enters the operating room he changes from street clothes to sterilized white duck. He then goes through an elaborate ritual of "scrubbing up" his hands and arms with hot water and antiseptic soap for ten minutes. He next washes his hands alternately in iodine and alcohol.

Surgical Lamps Cast No Shadows

In lighting an operation, 1,000 candlepower must reach the surgical field without heat, glare or the casting of shadows. This is now accomplished by a single incandescent lamp which projects its rays through seven lenses and mirrors, all forming a common focus of illumination, but coming from different angles, thus permitting the surgeon and his assistant to lean over their work.

X-ray machines carried by one man may now be brought to the patient. On the other hand, giant 900,000-volt X-ray tubes are being installed in hospitals for the treatment of cancer, one of these machines equalling in radiation power more radium than exists in the entire world.

Even radio is being used in the treatment of diseases. A diathermy machine, which creates artificial fever by sending short waves through the patient at the rate of 500,000 cycles a second, is used in the treatment of arthritis, rheumatism, and mental cases.

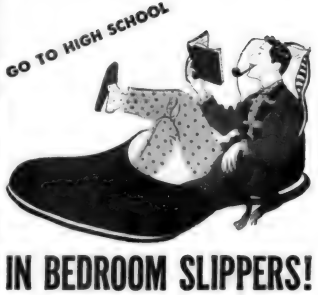
A few years ago oxygen tents made their appearance in the treatment of pneumonia, asphixia, heart disease, and head and chest injuries. Now a complete tent, weighing only nine pounds and small enough to be carried by one nurse, is available.

Machine Replaces Paralyzed Lungs

A respirator now being installed in hospitals is expected to save 50,000 lives a year. It was originally designed to give artificial respiration to infantile paralysis victims.

Paralysis patients have been kept alive for months at a time in the machine, finally recovering. The machine may also be used to treat emergency cases of carbon monoxide and gas poisoning, drug poisoning, alcoholic coma, drowning, smoke suffocation, diphtheria and electric shock. A midget machine is used to start breathing in new born babies.

Not only may breathing be restored and maintained, but a stopped heart may be started, the patient recovering if there is no destruction of the vital organs. Dr. Albert S. Hyman of New York has invented the "Hymanotor," a needle with an electrical connection, which may be thrust into the heart.



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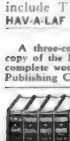

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"Nomad"—An All-Purpose Boat

[*Continued from page 96*]

the first set up to the finish. Most any material may be used. The most suitable materials will be specified and they will be in order of their suitability.

Building Frames and Keel

The frames are made to dimensions shown in Fig. 1. The frames at stations 1 and 4 are made watertight by a covering of one-quarter inch waterproof plywood. In the racing design, however, the frame at station 2 is made watertight instead of station 4. Frames that are not used as bulkheads have their corners joined by a knee as shown, and all frames that are not built as bulkheads have small notches cut as shown to allow the water to drain to the lowest point of the boat. All frames and bulkheads must be notched to let the chine, clamp and keel pass through as shown. If the boat is to be finished, natural varnish is recommended. Where extreme lightness is desired the frames may be routed out like an airplane spar (see Fig. 1-C). Be sure in any case that there is at least ¾" of solid wood around the edges of any piece.

The edges of the keel are curved as shown in the plan and a rabbet ¾" wide and ½" deep cut around the edge. Where a centerboard is fitted a slot 2¾" wide is cut as shown. The edges of the rabbet are trimmed off to a bevel after the planking is fitted. Fig. 6 covers all details of keel construction.

Cutting the Stem Rabbet

The stem (Fig. 8) is cut from a piece of white oak or ash, 12" wide, 33" long and 2½" thick. After cutting to shape the forward edge is beveled as shown and the rabbet lines laid out. It is fastened to the forward end of the keel with three ¼-inch brass or galvanized bolts. The planking rabbets are cut after the stem is set up and the planks fitted.

In cutting the stem rabbet a strip of wood the same thickness as the planking is bent around the frames and a series of notches are cut to accommodate the bevel of the strip. These are joined into one continuous rabbet.

The transom (Fig. 1-E) is built as any of the other frames with the exception that the after side is planked with mahogany or spruce boards ¾" thick. The edges of the boards are grooved and a white pine spline or tongue ¼" thick and ½" wide inserted in the grooves and the joint sealed with varnish or white lead. The edges of the transom are left square and after the frame is set up a strip of wood is bent around the frames and the bevels cut to suit the line of this strip.

The clamps and chine strips (Fig. 1) are made from strips of spruce, oak or ash one-half inch thick and one and a half inches wide. They should be about sixteen feet long

and the bevel of the chine is taken directly from the work on assembly.

The centerboard trunk is so thoroughly shown in Fig. 6 that little description is needed to construct it. The joint between the top and bottom boards is sealed with white lead as is also the joints in the ends. For the racing boat the top should be extended about six inches above the height and trimmed to shape after the deck beams are placed.

Frame Is Set Up on Floor

After all the foregoing pieces are made and assembled a smooth and level floor is selected. A centerline is drawn on this floor and at thirty-inch intervals lines are drawn across it exactly square with the centerline. The frames are now set up in their proper positions with their centerline coinciding with the one on the floor. See Fig. 1. The stem is fastened to the forward end of the keel and if a centerboard is fitted this is also screwed to the keel sealing the joint with white lead and flannel between the rabbet of the trunk and the keel. With this assembly complete the stem is fastened to the floor.

After all frames are set up, the chines and clamps are bent into the assembly and the whole structure fastened together with No. 6 brass or galvanized screws.

Side Planks Laid First

The sides are planked first. The space between the top of the clamp and the bottom edge of the chine is divided into three equal parts at each main frame. A mark is placed ¾" above these marks to represent the top edge of the two lower planks. A thin strip of wood is bent around the frames and each intermediate frame is marked with the position of this strip. The mark should be on the face of the frame as well as the edge as we will use these marks to get the shape of our planks later.

A strip of planking is bent around the chine and fitted to the rabbet of the stem. After the stem end is satisfactorily fitted the upper edge of the plank is marked off from the marks previously placed on the frames. The plank is now removed and the upper edge trimmed to the marks. After the plank is shaped it is fastened in place with No. 6 brass screws spaced three inches along the chine and along the top at each main and intermediate frame.

The next plank is sprung around the frame and its forward end fitted to the stem. Be sure that there is enough material at all points to make the ¾" lap required. The first plank put on should have been beveled along its upper edge to allow the one above it to lay flat. When the plank is in place the

[*Continued on page* 131]

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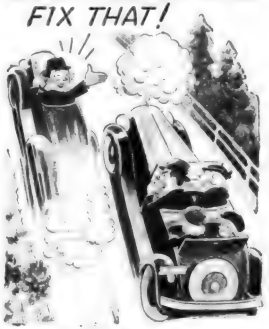

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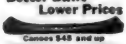

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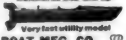

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How To Improve Your Bait Casting

[*Continued from page 70*]

ning of the line, caused by the spool revolving faster than the out-going line. You will then have a backlash to unravel, since improper control of the revolving spool is the chief cause of the backlash.

Before going any farther it might be well to mention that it is a good idea to go through the motions of casting with a bait rod, to get the moves fixed in your mind. This can be done without casting the line or lure, with the rod itself. Observe the need of keeping the elbow fairly close to the body or waist, permitting the wrist to do the work. In actual casting, hour after hour on the lake or stream, the bait caster assumes all manner of positions with his arm. It is a good idea, at the start, however, to keep the elbow fairly close to the body.

Wrist Turn Controls Reel

The position of the reel on the rod as you extend it in front of you for the start of the cast (see Fig 1-A) is with the reel handle pointing up.

A point might be stressed here. A slight turn of the reel on the downward finish of the cast to the left effectively slows down the momentum of the spool when you make too sharp or violent a cast and wish to slow up the spool.

The extreme position of the rod on the back cast and on the forward cast should be fixed in the caster's mind. With the casting hand as the pivot, the rod at the end of the back cast should be 45 degrees and also 45 degrees on the forward position as shown in Figs. 4 and 5. Remember to carry the rod up, back, forward and down as nearly as possible on a vertical plane.

When to Change Hands

When the lure drops to the water there is an important moment that occurs when the rod is passed from the right hand to the left, preparatory to reeling in. Some writers recommend changing the rod from the right to the left hand *while the lure is still in the air*, but that is radically wrong. To shift the rod from the right to the left hand *while the bait is in the air* is likely to cause a poorly completed cast. The psychological moment to shift the rod from right to left hand is when the bait has hit water.

Every writer who has ever striven to tell the amateur how to go about bait casting has consistently failed to tell how the rod is managed after the shift of the rod from the right to the left hand goes into effect. Some take the rod by the handgrasp (most rods have a lower and forward cork handgrasp), hold the rod thus, and commence reeling. This can be done where the reel has a level-winder, but

How To Improve Your Bait Casting

not otherwise. The method universally in use when the shift is made is to take the forward hand grasp in the left hand, hold the grasp in the palm, the reel being horizontal, with spooled line up, and handle off to the right side. The thumb and forefinger of that left hand instantaneously take the line in a pinch and guides it back and forth slowly.

The butt of the rod should be lodged against the waist near the pit of the stomach which holds the rod steady and makes it possible for the left hand, not only to hold the rod, but to set the hook the moment the fish strikes. When a fish seizes, the lure the left hand instantly goes into action, the pinch of the thumb and fore-finger holding the line from running out. The other fingers, circled around the grasp, tightens on the same and violently carries the rod up to set the hooks. Almost simultaneous with this the right hand thumb goes to the line to aid in checking any on-rush or get-away of the fish. Seeing the fish is under control, the right hand thumb and fore-finger then takes the handle and commence reeling in.

The World's Most Costly Blunders

[*Continued from page 40*]

filing into the courtroom and before the verdict was announced, the A. P. operator at the receiving set received a signal which he misunderstood to be that Hauptmann had been found guilty and sentenced to life imprisonment. The news was flashed to the A. P. offices in New York and to the headquarters of the broadcasting chains.

It is believed that the New York News reporter sent a signal to his receiver to indicate that the jury was filing into the courtroom and that the A. P. operator became confused.

A year ago newspaper editors fell victim to an April Fool joke that amused scientists throughout the land. Photographs coming from Germany showed a man flying through the air with a pair of rotor wings strapped to his chest. Captions under the photographs, republished in many American newspapers, explained that Pilot Erich Kocher was the first man to fly successfully under his own power. Kocher supposedly blew into a box which converted the carbon dioxide of his breath into fuel to operate the rotors.

Editors failed to note that no cable story had appeared previously describing what would have been one of the greatest achievements of science and forgot that carbon dioxide is not a combustible gas. The hoax originated in the Berliner Illustrirte Zeitung, which faked the pictures for April Fool.

Only recently newspapers published a story

[*Continued on page 133*]

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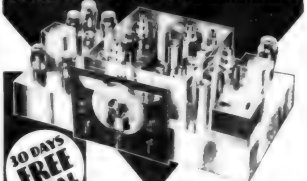

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Is Brooklyn Bridge Falling Down?

[*Continued from page* 65]

"If properly taken care of and overhauled, the towers and the four main cables would be good for hundreds of years. Right now we cannot allow heavy trucks to go back and forth and must divert them to the other bridges. The Brooklyn Bridge cannot stand the strain."

Hardly a blizzard hits New York but what some city official alarmingly expresses the fear of an ultimate crash of the Brooklyn Bridge, with its load of hundreds of people riding in trains and motor vehicles, into the East River.

The engineering world was greatly stirred, according to a veteran engineer on the city engineering staff, when it was discovered on July 24, 1901, that nine of the suspender rods had broken at the very center of the span on the north side of the bridge. The breakages were caused by changing temperature strains. Other breaks occurred in 1898 and 1922.

Today the Brooklyn Bridge is under constant vigilance. Engineers and mechanics are continuously occupied giving its vital parts the once over. A staff of over 100 men is engaged keeping the structure in trim. Commissioner Kracke gets a daily report on his gigantic patient.

Angling for Chinook Salmon

[*Continued from page* 71]

to 250 yards of 12 or 15-strand line.

Where the currents are strong, as in river channels, salmon anglers sometimes anchor their boats and let the swift-flowing water revolve their spinners.

Shore fishermen also are on hand to greet the silver tide. They, too, use varied tackle, but many find that the long-handled surf caster's rod is most adaptable for this style of angling. A sinker of around 3 ounces is important here, in order that the flashing lure may be carried close to the bottom where the salmon are traveling when leaving the ocean.

The salmon which start their pilgrimage early often furnish splendid sport in the more voluminous rivers. Here, also, a sportsman may take his game both from a boat or from the shore. But a heavy sinker is no longer needed, for the salmon are swimming nearer the surface, often rising porpoise-like out of the water.

Since a Pacific salmon does not feed after entering fresh water, it cannot be hunger that causes him to strike a gleaming lure. But he is a fighter by nature and will contest any other fish that crosses his path. To him the spinner or spoonhook is an unknown enemy and instinctively he charges to do battle.

"Nomad"—An All-Purpose Boat

[*Continued from page* 127]

lower edge is marked off from the first plank fitted and the upper edge from marks on the frames. Remember that the mark on the lower edge is not the cutting line. The plank must be trimmed ¾" below the mark. Note also how the ends of the planks are scarphed.

Placing Intermediate Frames

The plank should now be fastened to the frames with No. 6 screws and three-eights of an inch above the lower edge a series of one sixteenth holes are drilled, one and a half inches apart. (See Fig. 4). These holes are drilled for the entire length of the plank. After all holes are drilled, copper tacks one inch long are inserted in them and driven against a heavy piece of iron on the inside.

The bottom planking is laid in the same manner as the side, with the exception that all edges are parallel. Where the width of the plank next to the chine gets narrow the plank inboard of it should be let into the frames to preserve a fair line.

The intermediate frames (Fig. 3) are spaced on 7½" centers, three between each main frame. The bottoms of the intermediate frames may be made of ½" by 5" material, with plenty of lightening holes, which will eliminate separate floor supports. Frames forward of No. 4 will have a slight curvature which is determined after the framework is set up and the planking in place.

Construction of Skeg and Forefoot

The centerboard construction is covered in Fig. 7. It should be dowelled and grain locked as shown. The lead weight is to overcome flotation. A line or rod is attached to the screweye in the top to lift it up when coming in shallow water.

The skeg (Fig. 6) should be made for all the different types of boat and is fastened through the keel with No. 12 screws driven from the inside of the boat. If the boat is to be pulled up on the beach very much the bottom of the skeg should be protected with a strip of half oval brass or galvanized iron ¾" wide fastened with No. 8 screw. The forefoot is made in the same manner.

Next month we will cover remaining details of construction for the various versions of *NOMAD*.

BLUEPRINTS FOR NOMAD

Blueline prints of Nomad printed on tough paper to stand rough handling in the workshop are available at $3.00 postpaid. These prints contain both installments, including full instructions and all drawings greatly enlarged. Send your orders to Modern Mechanix Publishing Co., Minneapolis, Minn.

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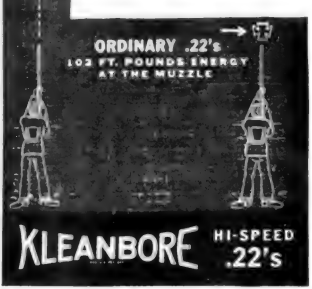

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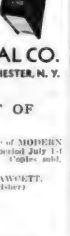

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Study Fish Scales With Microscope

[*Continued from page 59*]

transfer the scale to a clean slide and mount in two or more drops of balsam. When the slide is put away in flat position to dry and harden, it will be best to add a tiny weight to the cover glass to keep the scale from curling.

The first animals to own an overcoat of scales were sharks and their relatives, and from them were derived not only the other three types of fish scales but also the different kinds of teeth in the whole array of backboned animals.

The second type of fish scale is the *ganoid*, best shown by the fresh water gar common in eastern and central United States, or by the huge alligator gar of the Mississippi and its southern tributaries.

Some space exists between adjacent placoid scales, while ganoid scales are set closely together. In the remaining two types, they are shingled and overlapping. These are the clothes of the bony fishes, a group containing the great majority of both marine and fresh water species, such as the cod, herring, mackerel, trout, bass and sucker.

Ctenoid (pronounced teé-noid) scales have a comb-like fringe of projecting points on the margin that is covered by the scale ahead. *Cycloid* scales lack these points and are plain and rounded. *Cycloid* scales occur on suckers, carp and the domesticated gold fish. *Ctenoid* are found on perch, bass and sunfish.

Robot Pilots Explore New Airways

[*Continued from page 34*]

Leaving Seattle, Wash., with 300 carloads of supplies and constructional material, the S. S. *North Haven* is now heading for these remote Pacific isles, where she will leave men and equipment to establish air bases and build radio stations.

Japan, it is said, looks on with suspicion, wondering if pilots might accidentally veer a little off course, and look down into her new submarine bases. Secretary of the Navy Swanson frankly admits that the 8,500-mile air highway from California to China will be turned over to the government on request.

Some time this summer passengers will be able to board a plane at San Francisco, and four days later reach the airport at Canton, China. The trip today would require at least three weeks by steamer.

Radio direction finders working at distances of up to 1,800 miles from the transmitter will guide the giant Clipper ships, cruising over the ocean at 150 miles an hour or better.

Masts on the prow of each plane carry four wires which act as a loop, picking up signals from a similar, but larger, transmitting loop at each of the Pacific bases.

The World's Most Costly Blunders

[*Continued from page 129*]

from Bombay, India, describing discovery of fossil remains of a pygmy race of men fifteen inches tall. The story aroused the entire world of science. Museums and world famous scientists cabled the little village in India where the story originated. Eventually a reporter discovered that the story was a hoax concocted by natives, the result of a superstition that spreading a lie will avert bad luck.

North Pole Hoax Fooled World

The scientific public had not been so widely fooled since the amazing hoax perpetrated by Dr. Frederick Cook of Brooklyn, New York. He was acclaimed throughout the world as the discoverer of the North Pole, when on September 1, 1909, he reached Copenhagen and announced to the king of Denmark and to the world that he had reached the North Pole on April 21, 1908. Five days later, on September 6, 1909, Commander Robert E. Peary cabled newspapers and friends that he had reached the Pole on April 6, 1909, and found no trace of Dr. Cook's expedition.

Investigation revealed that Dr. Cook had hired a sea captain to work out a series of astronomical observations for latitude and longitude to cover the alleged polar sledge journey. Peary brought evidence which established that the imposter had never been within 500 miles of the Pole.

Men on Moon Accepted as Truth

The public had been fooled with all sorts of oddities, the masterpiece of which probably was the "Cardiff Giant." This famous "petrified man," ten feet two and a half inches tall, was turned up by well diggers on a farm at Cardiff, a village near Syracuse, N. Y., on October 9, 1869. Taken on tour, after the story had swept the country, the "giant" garnered from a gullible public admissions believed to have totaled $3,000,000. It was proved finally that the Cardiff giant had been carved in Chicago from a block of Iowa gypsum, aged with acid, and then buried for a year to further age it. The perpetrator of the hoax was George Hull.

The celebrated moon hoax of a hundred years ago fooled the scientific public and was widely accepted as truth. In 1835 a New York newspaper published a story stating that the noted Sir John Herschel had discovered inhabitants on the moon through a giant telescope erected at the Cape of Good Hope. The author of the story, Richard Adams Locke, minutely described the lunar men as "four feet in height, covered except on the feet with short, glossy, copper-colored hair and with wings composed of a fine membrane." Not until Herschel himself exposed the hoax was the story seriously questioned.

[*Continued on page 142*]

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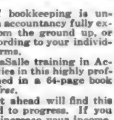

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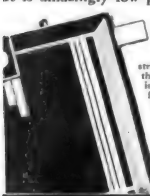

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Cheating Death In Daredevil Stunts

[*Continued from page* 46]

steel are hooked to its top and made fast by pulleys to stakes driven five feet into the ground. Then a gin pole with pulley, 14 feet high, is hooked on two upper rungs of the ladder. With that I hoist the second ladder up and fit its clamps into sockets of the first. The pole supports the second ladder until its four guy wires are made fast to the stake. The other ladders are erected similarly. I do the climbing and hoisting while a ground man secures the wires. Three stakes hold the thirty-two guys for the eight ladders. My little perch hooks on a rung of the top ladder and my weight keeps it firm.

Skill in rigging brought me directly into high diving, for I once was employed by a diver to erect his ladders.

I rig my tank, too.

Nearly circular, it is made of seven sections of corrugated steel held together by long pins fitting through hinges and secured to stakes with guy wires. A strong canvas bag placed on the ground inside is banked with earth. Five thousand gallons of water hold the bag firm.

A diver must have his own rigging and tank which are expensive. I designed and helped to make mine. I drive a truck laden with two tons of rigging to my engagements where three hours are required to set up tower and tank. During my appearance at Chicago's Century of Progress I used a 100-foot mast which had block and tackle to hoist me up in a boatswain's chair. I dived into a previously built pool. Some divers who do not know rigging must take the risk of employing perhaps unqualified riggers.

To avert death, it is necessary to strike the water in the center of the small tank, for safety and success depends on a perfect take-off. The perch must be squared exactly with the center of the tank and the diver must square himself. A take-off a half-inch out of line means striking three feet out of line.

Hazards of the Take-off

The greatest hazard is brushing a guy wire when taking off, especially in a dive with hands on hips with elbows out. A strong wind is likely to throw off a diver an inch or two at the take-off, causing him to strike the steel edge of the tank or the ground.

Once in New Jersey a volunteer guard touched a top guy wire when I was taking off. I felt my feet being thrown. While spectators screamed, I did some fast thinking. I tucked in my elbows by putting my hands to my sides to make myself narrow and tried to swerve my body to the right. I struck the water within an inch of the rim, slid along the canvas and sprang out unhurt. Had I not held

[*Continued on page* 141]

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Cheating Death In Daredevil Stunts

[*Continued from page* 135]

my arms to my sides the plunge would have been fatal.

My back somersault dive, in which I strike the water feet first and facing the ladder, is difficult. I stopped diving head foremost when I found that the terrific impact was threatening me with blindness. Last year a head-foremost high diver lost sight of one eye and escaped total blindness only by quitting.

Last year a young man in Florida startled the show business by doing a two-and-a-half front somersault from 122 feet. He was severely bruised each time, and I warned him he would not live long if he continued. Last August he was killed in a 65-foot dive at Swampscott, Massachusetts, when he failed to complete the second somersault and struck flat on his back.

Once I dived 165 feet from an airplane over the Halifax River in Florida. The wind rocked the plane and I took a chance on an imperfect takeoff. I struck the water with terrific impact while inclined some to the right. I was injured internally and lay in a hospital for five days. Now I insist that one somersault from 100 feet is thrill enough, at least for the diver.

Diver Cannot Look Down at Tank

The impact is so great that I must point my toes downward to avert the severe headaches that result from striking with feet flat. I must hold up my head or suffer blackened eyes. A few times I have looked downward after completing the somersault to make sure I was over the center of the tank and have had my face badly bruised. There isn't time even to jerk back the head in that swift descent. When people ask me what I think about, I say truthfully that during the 100-foot plunge I'm thinking that it's taking me a year to get down!

My springing out like a seal after the dive has caused some to believe the tank has a rubber or linen bottom. But the springing is just the trick of converting the downward momentum into an upward one, and it's less effort than clamboring up out of the tank.

The fire on the tank is a real danger. Two gallons of high-test gasoline are poured on the water at my signal when I am ready. When poised I give the signal for the torch and my speed carries me through without severe burning. I insist upon a 100-foot dive into fire because a lesser height would not give me enough speed for safety. While submerged I reach up and splash water on any remaining patches of fire to put them out. When I spring out I choose a spot where there is no fire.

As in diving, mechanical skill and scientific preparation are factors in the spectacular stunts of human flies. Weighing 135 pounds and being 5 feet 5 inches tall, I succeed through agility rather than strength, but a human fly needs also great strength of hands and arms and shoulders, in addition to cool nerves and courage and mechanical assistance.

The exploits of Daredevil Sig Smith, with whom I have performed often, afford the best study of a fly's work. His extraordinary strength makes it possible for him to clambor up high buildings. His powerful fingers enable him to grip ledges and depressions on the face of any building. He always spends many hours mapping his course up and down. He uses sills a great deal and, in clamboring down, will open windows from the top for sure holds on the middle sash.

Climbing buildings is an occupation for an expert. I tried once in Augusta, Ga., just for fun, and got up a story and a half and then couldn't move up or down. Smith climbed up and lent me his shoulder for support. But Sig refuses to high dive. He says he can't let go at 100 feet.

Smith once clung with three fingers to a rope attached to a steel point in the crown of the Statue of Liberty in New York harbor. The wind was so strong it kept his body nearly horizontal. I have tested Smith's strength. Once he held to a barn rafter with three fingers while supporting me and another man clinging to his feet.

Once I was called in by a southern police chief to make a fly's stunt safe. The fly announced he would cling to a cornice of a 12-story building with three fingers while a girl swung below in a seat made fast to his ankles. I attached steel wire to a ring suspended from the roof and secured the wire to a hook in the fly's hand. The wire extended downward to a leather waist band, invisible under his shirt, and to a band around his ankles. The girl, swung out of the tenth story window, was really held up by the wire. But the fly was indignant that his stunt has been "spoiled" by rigging!

Human Flies Dance on Tight Wire

Another stunt of human flies and acrobats that seems very dangerous is riding a bicycle on a tight wire stretched over a waterfall or a body of water while an acrobat sits on a trapeze suspended by wires attached to each side of the bike. The stunt is really safe. The

[*Continued on page* 143]

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Fame and Fortune Await Inventors

[*Continued from page* 85]

end of a twist drill to act as a guide so that the drill could be sharpened accurately on a grinding wheel, would be a certain winner.

If the frame of a small jack-plane could be made from heavy pressed metal, such planes could be sold for ten cents and a fortune could be realized with the patent rights.

A non-slipping screw-driver which will not jump out of the groove is still in demand. Millions could be sold and the inventor would become fabulously wealthy within a year.

Any expert cabinet maker will admit that applying hot glue with a brush is far from satisfactory. The brush does not spread the glue evenly and a reservoir is needed which will distribute quickly an even film over the surface.

The man who invents a pair of pliers with parallel jaws will cash in on a problem which has been with us for years. Where a firm grip is needed over a wide surface, pliers with jaws not opening at angles would be extremely valuable and would bring $100,000 in royalty in no time.

There is need for an automatic chisel sharpener which would function like a razor stropper. A little attachment to fit over a whetstone and operated with a handle would do the trick. The angle of the chisel must be adjustable.

The World's Most Costly Blunders

[*Continued from page* 133]

Probably the world's greatest blunder occurred at the battle of Waterloo, the result of which affected the course of history. At the turning point of the battle one of Napoleon's generals, Grouchy, failed to heed the counsel of fellow generals who urged him to join Napoleon instead of trying to follow the enemy Prussian army. Twelve hours too late Napoleon sent an urgent message to Marshal Grouchy to come to his assistance. But the Prussians had engaged Grouchy in battle and he was unable to carry out the emperor's orders. As a result the allied reserves which Grouchy should have attacked were free to join Wellington and defeat Napoleon.

Even George Washington's name has been used to perpetrate a hoax. For about one hundred years the story was told and retold as truth of young George Washington and the cherry tree and his famous remark: "I can't tell a lie, Pa; you know I can't tell a lie. I did cut it with my hatchet." An itinerant bookseller, Mason L. Weems, in 1800 wrote "A History of the Life and Death, Virtues and Exploits of General Washington." The peddler concocted the tale to help sell his book.

Cheating Death In Daredevil Stunts

[*Continued from page* 141]

tire-less rim of the bike affords a flange to grip the wire, and the weight of the acrobat automatically holds the bike upright so that it cannot fall!

Sig Smith does stranger stunts with bicycles, often riding blindfolded around the cornices of high buildings. In Asheville, N. C., he rode down a sloping roof, jumped off the bike when nearing the edge and let the bike go off the roof, checking its drop and pulling it back by a strap on his wrist.

I don't say Sig used any trickery, for he has strength and nerve enough to do that stunt unaided, but rigging could add a degree of safety to such bicycle stunts. Steel wires could secure the bicycle invisibly to fastenings on the roof.

Human fly stunts on airplanes are spectacular thrillers, but very often they are not as dangerous as they seem. Sig Smith brought into that field his aviation experience. As a former instructor in parachute jumping he found the perilous stunt of delayed 'chute opening quite easy.

He sits in a chair on the wing of a plane doing an inside loop. He hangs by his teeth from a leather mouth grip suspended from the undercarriage of a plane in flight. He stands on head and hands on the center section of a plane doing a loop.

I don't say that all airplane stunts are rigged, but obviously many of them are. Without rigging some would be impossible. Employing steel wire, both chair and man could be secured to a plane for the chair stunt. Similarly, wire could hold hands and body securely in the head-standing feat. But don't think it wouldn't be a bit risky!

How Flagpole Sitters Relax

Flagpole sitting requires endurance and knowledge of how to relax and change one's position frequently, though only slightly, to prevent excessive strain on muscles and internal organs. That is how Alvin "Shipwreck" Kelly was able to sit for 49 days on a 250-foot pole above the Steel Pier at Atlantic City in 1930, and stand 100 hours on a plank atop a pole in Irvington, N. J.

A mystifying thriller at carnivals is the "human cannon-ball." The performer nests in the cannon and, after a smoky explosion, is hurled 100 feet to land in a net.

Of course, the "cannon" is only a patented mechanical contraption. A cap outside the cannon is set off to provide the noise. Compressed air ejects smoke from the muzzle. The propelling force is not an explosion but a steel spring under a leather pad on which the man stands. It is dangerous, however, for unless the man is perfectly rigid when the spring is released his neck is likely to be snapped.

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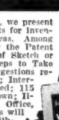

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INVENTORS – See page 12

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Midget Auto Racing Sport

[*Continued from page 49*]

tracks is the 2-cycle, 4-cylinder outboard motor, which is capable of turning 7,000 r.p.m. and developing 50 horsepower.

The midget car is not equipped with foot-brakes. An emergency hand-brake is employed only on the turns to affect a sharp skid instead of slowing down. Most drivers, however, take the turns at full speed but release the accelerator to permit the compression to "brake" the wheels slightly.

The track surface is a combination clay and sand, neither too soft nor too hard. The ideal midget automobile track is from one-fourth to one-fifth of a mile in length. On the straightaway the indoor track is 35 feet wide. It is 60 feet at the turns.

Banked Turns Are Not Used

Because of their light weight, these midgets are better handled on a flat turn. They do not cling to the surface of a banked turn as readily as would a heavier car.

Spectators enjoy the harum-scarum manner in which races are run. Starting off in a pack, the cars swing quickly into a dangerous snarl which calls for alertness and driving skill. They bounce and bump around the curves, scraping wheels and nicking paint until one wonders how these small machines remain intact.

While danger rides at the wheel of every midget, sane driving still remains the watchword of all racers.

A yellow flag designates the start of a race and later signals a clear track. The red flag, used in case of accident, orders all cars stopped immediately. A green flag designates the start of the last lap while the checkered flag denotes the finish of a race.

All Drivers Wear Metal Helmets

In midget auto racing drivers are required to wear suitable protective helmets, preferably constructed of metal. Harry Lewis, an excellent driver, is alive today because of a metal helmet he was wearing when he turned over recently in the heat of a race. Harry's helmet was literally split in two. Without the helmet his injury would have been serious.

Another safety feature is the unique construction of the midget bodies, which are built high in front and rear of the driver's seat. In the event of an accident a driver may crouch low in his seat and thus lessen the danger of injury when the car overturns.

Ten, fifteen and twenty-five lap events are the rule in midget racing. Prizes range from $25 to $100 for the indoor events. Officials of the Midwest Auto Racing Association predict that prizes may run as high as $5,000 when the sport moves to Soldier Field in Chicago during the coming summer.

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29x4.75-20		2.50	0.95
29x5.00-19		2.85	1.05
30x5.00-20		2.85	1.05
28x5.25-18		2.90	1.15
29x5.25-19		2.95	1.15
30x5.25-20		2.95	1.15
31x5.25-21		3.25	1.15
28x5.50-18		3.35	1.15
29x5.50-19		3.35	1.15
30x6.00-18		3.40	1.15
31x6.00-19		3.40	1.15
32x6.00-20		3.45	1.25
33x6.00-21		3.65	1.25
31x6.50-19		3.60	1.35
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33x4	2.95	0.85
34x4	3.25	0.85
32x4½	3.35	1.15
33x4½	3.45	1.15
34x4½	3.45	1.15
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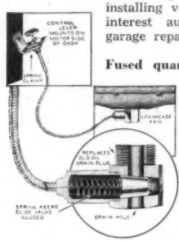
A handy pick-up plier, equipped with a knurled tip and tapering point and offered in straight or bent nose models, is now on the market.

A device for counterboring cylinder blocks and installing valve seat rings will interest auto mechanics and garage repairmen.



Motorcar crankcases can be drained easily from the dashboard by operating control lever which opens or closes new valve.

Fused quartz sockets for the new Acorn-type radio tubes are now available. These reduce current losses in ultra-high frequency radio experiments.

Regulations for water polo, with kyacks may be obtained in booklet form free of charge by sports lovers.

Natural color film for "still" or movie cameras recently was made available to amateurs. Since the color filter pattern is laid out in the celluloid base of the film, no additional filters are needed.

A chemical chimney cleaner, thrown on the hot coals in the stove or furnace, decomposes soot which escapes up the chimney as smoke.

Copper paint, made by mixing the powdered noncrystalline metal with a recently developed carrier, provides a rust-proof, acid-resisting coat. Eight years were required to bring forth the liquid copper which is claimed to be 98.3 per cent pure.

A new, low-priced electric welder is easily transportable and has a variety of uses. It weighs 50 pounds. To prevent overheating, a 3,500 r.p.m. motor drives a combination fan and blower to cool casing and coils.

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